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Agricultural Conference.

At Toowoomba, 9th, 10th, 11th and 12th June, 1902.

An Agricultural and Pastoral Conference, organised by the Department of Agriculture, similar to the conferences held at Gatton in 1897, at Rockhampton in 1898, at Mackay in 1899, at Warwick in 1900, and at Bundaberg in 1901, was held in the Town Hall, Toowoomba on the 9th, 10th, 11th, and 12th of June, 1902, and was attended by 135 representatives from ninety-three agricultural, horticultural, and pastoral societies of the State. The delegates were:—

The Hon. D. H. Dalrymple, M.L.A., Secretary for Agriculture, in the chair.

National Agricultural and Industrial Association of Queensland, Brisbane—J. A. Hayes and J. Reid. Queensland Fruit and Economic Plant Growers' Association, Brisbane—W. P. Cooksley. Queensland Acclimatisation Society, Brisbane—L. G. Corrie and E. Grimley. Queensland Chamber of Agriculture. Brisbane—The Hon. A. J. Thynne, M.L.C., and C. Atthow. Queensland Nurserymen's Association, Brisbane—J. Williams. Horticultural Society of Queensland, Brisbane—J. Soutter and W. T. Bick. United Pastoralists' Association of Queensland, Brisbane—S. B. Kennard.

Zillmere Horticultural Society, Zillmere—J. W. Lee and R. Sumner. Nundah Horticultural, Agricultural, and Industrial Association, Nundah—J. Corbett. Upper North Pine Farmers' Association, Terrors Creek—C. Hay. Mount Mee Farming and Industrial Association, Mount Mee—J. Lowrie. Maroochy Pastoral, Agricultural, Horticultural, and Industrial Association, Woombye—H. Smith and J. Lindsay. Mapleton and Dulong Fruitgrowers and Farmers' Progressive Association, Mapleton, *viâ* Nambour—E. H. Biggs. Palmwoods Fruitgrowers' Progress Association, Palmwoods—M. C. Cotterell. Peachester Progress Association, Peachester—O. Jones. Buderim Mountain Coffee and Fruitgrowers' Association, Buderim Mountain—W. H. Guy. Kenilworth Farmer's Association, Mount Ubi, Eumundi—J. C. Hassall.

Mount Cotton and Redland Bay Fruitgrowers' and Farmers' Association, Mount Cotton—H. Heinemann.

Logan Farming and Industrial Association, Beenleigh—F. W. Peck and W. G. Winnett. Agricultural and Pastoral Society of Southern Queensland, Beenleigh—J. E. Young and G. F. Dauth. Logan and Albert Agricultural and Pastoral Society, Beaudesert—M. Selwyn Smith. Southern Queensland and Border Pastoral and Agricultural Society, Nerang—R. Hope and W. Andrews.

Ipswich and West Moreton Agricultural and Horticultural Society, Ipswich—J. Germain and P. W. Cameron. Fassifern and Dugandan Agricultural and Pastoral Society, Boonah—J. L. Bowman and J. C. Tunstall. Lockyer Agricultural and Industrial Society, Blenheim. Laidley—F. Drew and J. C. Neilson. Forest Hill Farmers' Progress Association, Forest Hill—W. S. Brimblecombe. Rosewood Farmers' Club, Rosewood—A. Grant and W. Berlin.

Drayton and Toowoomba Agricultural and Horticultural Society, Toowoomba—A. H. McShane and V. C. Redwood. Royal Agricultural Society of Queensland, Toowoomba—W. R. Robinson and J. G. Palethorpe. Pittsworth Pastoral and Agricultural Association, Pittsworth—J. J. Daniel and J. Trott. Crow's Nest Agricultural and Horticultural Society, Crow's Nest—F. Smith and T. Hamlyn. Darling Downs Agricultural and Industrial Association, Clifton—J. Gillam. Central Downs Agricultural and Horticultural Association, Allora—W. Deacon and G. Moulday. Eastern Downs Horticultural and Agricultural Association, Warwick—W. D. Lamb and A. Tulloch. Danderoo Farmers' Progress Association, Danderoo—Wm.

Atkinson. Stanthorpe Viticultural and Horticultural Society, Stanthorpe—J. H. Finlayson. Border Agricultural, Horticultural, Pastoral, and Mining Society, Stanthorpe—K. W. Scholz and E. Gleeson.

Northern Downs Pastoral and Agricultural Association, Dalby—W. Grant and A. McLeod. Western Pastoral and Agricultural Association of Queensland, Roma—W. Miscamble. Roma Farmers' Association, Roma—D. Brown. Yingerbay Farmers' Association, Roma—D. Smith. Hodgson Farmers' Association, Hodgson—J. Stevenson.

Gympie Agricultural, Mining, and Pastoral Society, Gympie—E. Bytheway and F. Vaughan. Gympie Central Farmers' Association, Gympie—D. Webster. Gympie Horticultural Society, Gympie—W. E. Burbidge and J. Davies. Deep Creek Farmers' Progress Association, Gympie—W. Pugh. Chatsworth Farmers' Progress Association, Gympie—H. G. Percival.

Wide Bay and Burnett Pastoral and Agricultural Society, Maryborough—A. W. Cameron and E. A. Hyde. Maryborough Horticultural Society, Maryborough—H. A. Jones and F. W. Turley. Maryborough Dairymen's Association, Maryborough—A. McMeekin. The Island Farmers' Progress Association, Maryborough—J. E. Dean. Tinana Fruitgrowers and Farmers' Association, Tinana—H. Davis. Pialba Farmers' Association, Pialba—J. B. Stephens. Brooyar Farmers' Progress Association, Brooyar—F. S. Schoolick. Biggenden Agricultural and Pastoral Association, Biggenden—F. F. Kernke and W. Nott. Degilbo District Farmers' Association, Degilbo—F. W. Warmington and E. P. Itzstein. Dallarnil Farmers' Association, Dallarnil—H. A. Tardent. Mungore Farmers' Association, Lakeside—W. Fowler.

Bundaberg Agricultural, Pastoral, and Industrial Society, Bundaberg—W. F. Marshall and H. N. Thornburn. Bundaberg Council of Agriculture, Bundaberg—D. Watson and C. Marks. Bundaberg Horticultural Society, Bundaberg—A. T. Coomber and H. E. Ashley. Avondale Planters and Farmers' Association, Avondale—C. Thygesen. Gooburrum Farmers and Canegrowers' Association, Gooburrum, Bundaberg—W. J. Tutin. Isis Agricultural Association, Childers—E. H. Wells and E. Perske. North Isis Canegrowers' Association, Hapsburg—T. E. Barnes. Kolan Canegrowers and Farmers' Association, Kolan—J. W. Chapman. South Kolan Farmers and Planters' Association, South Kolan—W. Harvey. New Hope Farmers' Association, Birthamba—M. Jensen. Woongarra Canegrowers and Farmers' Association, Ashgrove, Bundaberg—A. H. Smith.

Rockhampton Agricultural Society, Rockhampton—R. F. Parker and W. F. Rogers. Central Queensland Farmers and Selectors' Association, Rockhampton—W. Lawrence and D. Whiteley. Central Queensland Stockowners' Association—Rockhampton—J. McPherson. Alton Downs Farmers' Association, Rockhampton—J. Edminstone and L. J. Landsberg. Stanwell United District Farmers' Union, Stanwell—C. Halvorsen. Peak Downs Dairymen and Settlers' Association, Clermont—A. G. Pursell.

Bowen Pastoral, Agricultural, and Mining Association, Bowen—A. Pott. Bowen Fruitgrowers and Farmers' Association, Bowen—J. Kyle. Pioneer River Farmers and Graziers' Association, Mackay—C. P. Mau and F. J. Stevens. Townsville Pastoral, Agricultural, and Industrial Association, Townsville—W. J. Affleck and C. R. Hopkinson. Johnstone River Canegrowers' Association, Geraldton—L. J. Moody and W. E. Molle. Herbert River Pastoral and Agricultural Association, Ingham—N. C. Rosendahl and D. Pearson. Halifax Planters' Club, Halifax—A. L. Anderson. Herbert River Farmers' League, Halifax—H. G. Faithfull. Fairford Farmers' Association, Ingham—W. Berry. Victoria Farmers' Association, Ingham—J. Barnes. Ripple Creek Farmers' Association, Ingham—A. Campbell. Macknade Farmers' Association, Macknade, Herbert River—E. S. Waller.

Cairns District United Farmers' Association, Nelson, Cairns—N. P. Petersen. Hambledon Planters' Association, Hambledon Junction, Cairns—W. L. Hawkins. Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association, Port Douglas—P. E. A. Crees and T. T. Devine. Mosman Farmers' Association, Mosman, Port Douglas—S. Johnston, junr.

Officers of the Department of Agriculture :—Messrs. Peter McLean (Agricultural Adviser), A. H. Benson (Instructor in Fruit Culture), A. J. Boyd (Editor of the *Queensland Agricultural Journal*), D. Jones (Inspector, Diseases in Plants Act), H. Tryon (Entomologist and Vegetable Pathologist), and W. C. Quinnell, M.R.C.V.S. (Government Veterinary Inspector).

FIRST SESSION.

MONDAY, 9TH JUNE, 1902, 8 P.M.

Proceedings were commenced by the welcoming of the delegates to Toowoomba by the Mayor, Mr. C. Rowbotham. The Hon. D. H. Dalrymple, M.L.A., after returning thanks for the very kind expressions of welcome, then delivered the following opening address:—

CHAIRMAN'S ADDRESS.

GENTLEMEN,—It is my duty and my privilege to bid you all a hearty welcome to this Conference, and to express the hope and belief that good results will follow from our deliberations. I think we ought to congratulate ourselves on the fact that we have met in the beautiful capital of the most important agricultural district in Queensland, even though it is not now at its best, but, in common with the rest of the State, is suffering from the worst drought we have ever experienced. I am glad that among the subjects set down for discussion is "The drought"; for, though we cannot control the seasons, we may be able to devise some means, within the limits of our financial resources, of minimising the evil effects of an abnormally long period of dry weather. I expect my own information and ideas on the matter to be largely supplemented and influenced by the proposals and suggestions which will be made by those among you who have given serious thought to the question. It is no doubt the problem of the hour, and the problem of all others which will render the man who propounds a practicable solution of it our greatest benefactor. I can assure you that whatever I can do to advance a scheme that appears to me to be workable I shall do.

CONFERENCE RESOLUTIONS.

At this Conference, as at the last, I shall be an attentive listener, for I know what an advantage it is to the Minister of Agriculture to learn at first hand the difficulties that beset the farmers and their proposals for overcoming them. Your papers and discussions will not be lost on me, and the resolutions you adopt will receive my most respectful consideration. In this connection I ought to inform you with respect to the last Conference, held at Bundaberg, that I did not allow the resolutions it passed to be ignored. In every case I gave full consideration to the recommendations made, and wherever it was in my power to do so I gave practical effect to them.

AGRICULTURE.

At the time of the last Conference I had to speak of the drought and its consequences. Since then twelve months have passed away, and the same drought still continues. The farmer is employed now, as then, in fighting its effects rather than in making advances in new directions. Yet, notwithstanding this severe misfortune, the statistics of the Registrar-General show that Queensland is a wonderful country, and that the confidence of the farmers in its capability has not been shaken. The area reaped for wheaten grain in 1901 exceeded any previous year, and the average yield per acre has not been surpassed since 1891. The figures for the last two years for grain are:—

1900—79,304 acres; 1,194,088 bushels; 15·06 bushels per acre.
1901—87,232 „ 1,692,222 „ 19·40 „ „

The average yield for New South Wales for 1901 was 10·6 bushels, and for South Australia 5·66.

A recent and most satisfactory development of the wheat industry has been the sales of wheat by public auction upon lines similar to those in connection with the wool trade, and resulting in the farmers obtaining a better price for their grain. The area under malting barley increased from 1901 by 516 acres, the average yield for the year being 28·39 bushels to the acre, the highest yields being in the Killarney, Allora, and Warwick districts, with 37·60, 32·08, and 31·74 bushels to the acre respectively. The statistics for 1901 have proved that the production of grain was equal to 98·6 per cent. of the total quantity of malt made during the year, or, in other words, practically the whole of the malt made in Queensland was from barley grown within the State.

For other barleys, the yield was 16·84 bushels, as against 15·62 for 1900. New South Wales averaged 17 bushels, New Zealand 33·33 bushels, and the United Kingdom 30·98 bushels to the acre. Although a lesser extent of land was under maize for grain, the decreases for 1901 being 10,991 acres, the production was greater

by 112,471 bushels than in 1900, the average return per acre being 21·96 bushels, as against 19·20 bushels. The three principal grain crops to which attention has been drawn show conclusively that even in the time of drought Queensland can hold her own for general farming, and that the cry that is occasionally heard, that there is not a living in farming, has no foundation. For all classes of produce, prices have been exceptionally good throughout the year. There is a tendency among small holders, whose land lies near towns, to give more attention towards market gardening, and especially is it so in situations where water is available for irrigation. A further impetus to general farming on the Downs has been given through the opening of the Gowrie, Mount Russell, and Goomburra Estates, all of which have been taken up by men who will, if seasons are favourable, soon make an appreciable difference in the total production of this State. Farmers from the South, with more or less capital, continue to come here to find land, and in most instances those that come are but the forerunners and representatives of many others.

SUGAR.

Although, during the year, in the Southern districts, drought conditions operated and frost was prevalent, it is satisfactory to note that for the whole State there was an increased yield of sugar of 28,304 tons, the total yield reaching 120,858 tons, as against 92,554 tons for 1900. The total area under cane was 112,031 acres, as compared with 108,535 acres in 1900. Of this area 78,160 acres were crushed, as against 72,651 acres in 1900, the average yield per acre increasing from 1·28 tons in 1900 to 1·55 tons last year. Taking the average price of raw sugar at £10 per ton, it will be seen that the year's output represents an increase in value of £283,000 over that of the previous year, the canegrowers receiving about £130,000 more than in 1900 as the result of their labours. The quantity of sugar exported from 1st June, 1901, to 31st March, 1902, was 78,190 tons; if to this is added 28,270 tons required for consumption in the State, it will be seen that the quantity held in Queensland in excess of the State's requirements is 14,398 tons. The estimated amount required by the Commonwealth is 138,000 tons, and if the farmers only give the necessary attention to the cultivation of the fields on proper scientific lines, and, where possible, utilise for irrigation purposes the water now unfortunately, with very few exceptions, allowed to run to waste, this tonnage will not only be reached, but it can be confidently stated that with recurring good seasons, and the settlement of the labour problem, now unfortunately in a very uncertain state, the whole requirements for Australia can be supplied from Queensland alone.

FRUIT GENERALLY.

Despite the phenomenally dry season, fruit culture has continued to make steady progress during the past year. The planting of both deciduous and evergreen fruit trees has been considerably increased, and, from present indications, a further increase is likely to be made during the current planting season. Many of the younger orchards in various parts of the State have produced fruit for the first time this past season, particularly so in the Stanthorpe district, where there are nearly 50,000 fruit trees of various kinds planted, a large percentage of which are of selected varieties well adapted to the district, and producing fruit of high commercial value. The pineapple industry is in a fairly thriving condition. The fruit, it is true, has been rather undersized owing to the dry weather, but the quality has been very high. Prices have been satisfactory, and are likely to continue so, as a demand for canning has sprung up and is likely to increase, a good Southern market having been assured. This industry is capable of considerable extension, if properly handled, as this State has practically a monopoly of the business as far as Australia is concerned. The citrus crop, which at one time promised to be a record one, has turned out somewhat disappointing, as the trees in many districts have suffered severely from the drought, the output being small and the fruit undersized. During the year this Department called together a meeting of citrus-growers in Brisbane, the result of which has been the formation of the Queensland Citrus-growers' Association—the first practical attempt at active co-operation in our fruit industry. The association has been at work for about two months, and, as the results to date have been decidedly encouraging, it is hoped that a satisfactory solution of the best means of disposing of our surplus fruit has been achieved, especially as it is the intention of the Association to handle fruits other than citrus.

The banana crop has, during the past year, been very free from the fruit fly, and the trade, with the prices obtained in the Southern States, has been good. The duty on green fruit, that has up to the present been charged under the Federal Customs Act, has considerably helped the growers in the North in holding their own with their rivals of Fiji and New Caledonia. The production of green bananas in 1900 was 2,321,108 bunches. In 1901 the production was 2,313,719 bunches.

Viticulture.

The area under vines is steadily increasing, as fruitgrowers are awakening to the fact that few fruit trees give so good a return as a well-tended vineyard of selected table grapes. One grower, in the Esk district, enjoys a return of £60 per acre from table grapes. There is little fear of over-production for some time yet, as the local demand far exceeds the supply, and the Commonwealth markets offer a tempting invitation to the Queensland vignerons. In this direction, indeed, there is a great opening for Queensland growers to produce early table grapes, which would arrive in the Southern States before the local fruit could ripen, and would command remunerative prices in a practically inexhaustible market. These grapes could be grown in various localities from Brisbane to Bundaberg. The increased importation into Queensland of wines from the other divisions of the Commonwealth, consequent upon interstate freetrade, has momentarily checked the manufacture of wine in this State. But, with more attention on the part of our winemakers to the choice of appropriate varieties of grapes and improved processes in the cellar, Queensland wines would be found equal in quality to the majority of the Southern wines—in fact, in certain types, we could produce a wine superior to any made in Australia of the same class. The new varieties brought from different European countries by the Department of Agriculture are now coming into bearing. Some of them, especially the Douro vines from Portugal, show remarkable vigour and adaptability to our climatic conditions, and it is confidently expected that they will assist in improving the port type of wine made in Queensland. Some fine table grapes amongst these new varieties will also prove valuable to growers.

Coffee.

The area under coffee continues to increase, and the reputation of Queensland coffee is becoming known outside the borders of the State. Since the last Conference, the Instructor in Coffee Culture, Mr. Newport, was sent through the Southern States to bring our coffee under the notice of merchants, and to compare it with the quality imported from oversea. Although his mission did not immediately bear fruit, it is thought that the result will be satisfactory to Queensland growers. The region for coffee cultivation that is mostly favoured lies on the coast side of the Main Range from Mackay northwards, although some really good plantations are to be seen further south, notably at Buderim Mountain. The statistics show that the annual increase in cultivation has been regular; in 1898, there were 432 acres under cultivation; in 1899, 495 acres; in 1900, 537 acres; and the crop for 1901 can be estimated at 547 acres.

Tobacco.

This area under crop, owing to the presence of the Experimental Farm, under the management of our Tobacco Expert, is increasing in the South-east of Queensland. In 1900 the area around Inglewood under tobacco was 75 acres, and in the Texas district 581 acres. For 1901, the Registrar-General estimates the figures to be 72 acres and 692 acres respectively. The drought has been severe in the Texas district this year, but during 1901 a crop was reaped that brought the highest price in the Queensland market. Our Queensland methods as taught by Mr. Nevill have been sufficient to induce the Minister for Agriculture in Victoria to send his tobacco expert to visit the Texas farm.

The Pastoral Industry.

During the year the effects of the continued drought on our pastoral industry have been even more disastrous than in 1890, and in many portions of the West the stock may be said to have been practically wiped out. Numerically, indeed, the losses have not been so great as those of the previous year; but that can be readily accounted for by the fact that during 1900 over 30 per cent. of the sheep and nearly 20 per cent. of the cattle that had survived the severity of previous years succumbed to the drought. The decrease for the two years ended 31st December last was 35 per cent. in sheep and nearly 27 per cent. in cattle; and, unfortunately, there is every reason to assume that the losses since the last enumeration have been equally heavy in proportion to those of the two previous years. The only bright feature in an otherwise dreary picture has been the continued advance in values of live stock and wool. These, however, do not compensate for the great falling off in our meat exports, which has enabled foreigners to usurp our place in the British meat markets. Our herds are not affected as much as formerly by ticks and tick fever, and, therefore, the question arises whether the gradual relaxation of the quarantine restrictions, which has been the policy of the Department in the past, should not be extended even further in the direction of their removal; for these restrictions have a tendency to close the best markets to a large

area devoted to cattle-raising, to block the restocking of country denuded of stock, and to prevent the movement of cattle from country devoid of grass and water to districts where both are relatively plentiful. I intend to confer with the Stock Board immediately on my return to Brisbane with the view of ascertaining what action may be advisable. Possibly at no distant date it may be considered advantageous to remove these barriers altogether.

MEAT AND DAIRY PRODUCE ENCOURAGEMENT.

The number of meatworks erected under the provisions of the Meat and Dairy Produce Encouragement Act has not increased during the past year. The subsidised companies, however, with the exception of three of the smaller companies, report that, notwithstanding the long-continued drought, they have operated their works successfully during the year under review. This fact is very gratifying, and is, as stated at the last Conference, due to the excellence of the tinned meats manufactured by the works, which always find ready and remunerative markets in South Africa and the Philippines. The companies, it is pleasing to know, have met the payments demanded under the Act, and it has now been definitely decided to pay a dividend to the contributors to the fund from the moneys thus repaid by the companies operating in the Northern, Central, and Southern districts under the Act. This action will distribute a sum of £20,000 among these contributors, who, generally speaking, have experienced and are, unfortunately, still acutely experiencing the disastrous effects of this unprecedented drought.

BACON AND HAM.

The quantity of bacon and ham manufactured during the year shows a decrease of 620,732 lb. on the quantity manufactured in 1900, the figures being, respectively—1900, 7,685,446 lb.; and 1901, 7,064,714 lb. The value of the exports also decreased from £45,846 in 1900 to £31,399 in 1901. The value of the ham exported, however, shows an increase of about £4,000, but bacon shows a decrease of £18,000 odd, making the total decrease of £14,447, as indicated by the figures quoted. The product, it is, however, pleasing to know, still retains its position in the markets outside this State—a fact due to the closer attention paid by the breeders to their stock and the excellent systems of manufacture existing at the various factories.

DAIRYING.

The butter manufactured in 1901 was 9,741,882 lb., being no less than 1,061,493 lb. more than in 1900. The exports increased in value from £51,729 in 1900 to £86,171 last year, an increase of £34,442. This large increase is mainly attributable to the fact that the co-operative factories mentioned last year as having been established, or in course of establishment, have proved a complete success. I cannot better illustrate this than by quoting the following paragraph from the *Queensland Farmers' Co-operative News* of the 15th May, with reference to the operations of the Queensland Farmers' Co-operative Dairy Company, whose factory is situated at Booval, near Ipswich:—"This company has now been in active operation for twelve months, and we have no intention of anticipating the directors' annual report, but we congratulate them on surviving the most critical period of any company's existence. The turnover for the period under review has run into £51,000, and the greater part of the produce has been distributed by the company's own employees. This we regard as the most important departure of the company, as there are often serious leakages between the producer and the consumer, and the company deserve credit for their pluck in starting this branch of their business, as it not only ensures their getting current market rates for their produce, but it gives them a voice in what the current market rates shall be, and if the farmers would only form a strong combination and demand full market value for all their produce they would be masters of the situation." The development in the manufacture of cheese continues on the up grade, the quantity for the year reaching 2,436,912 lb., or an increase of 452,207 lb. on the output for 1900. If the increase for 1900 is added to the increase for this year, it will be seen that in two years the output has increased by 1,013,637 lb., equal to nearly 60 per cent. The value of the exports of this product has risen from £626 in 1900 to £6,015 in 1901.

Another substantial reason for considering that, with improved seasons, the dairying industry in this State, more especially in the Southern portion, will surpass the most sanguine expectations, is that the condensed milk, manufactured by the factories now preparing that product, is more than holding its own in the open market with the imported article.

Departmental Officers.

Did time permit, it would give me great pleasure to refer in detail to the efforts of the technical officers of the Department, each of whom is doing his best in his own sphere to advance the cause of agriculture. Some of these gentlemen will be present at this Conference, and will contribute by their knowledge and experience to the value of our deliberations. There is, indeed, one expert who not only has no superior and probably no equal in the world in his own special field, but is distinguished by his proficiency in scientific agriculture generally, who, I regret, will not be able to share in our discussions: I refer to Dr. Maxwell, who I had reason to hope would be present, but who has been detained in the South by illness. Short as is the time which has elapsed since his arrival in Queensland, he has amply justified his appointment. He has not only introduced new principles of sugar cultivation, which our more enterprising growers have adopted with excellent results, but has induced the Commonwealth Government to agree to certain tariff arrangements which will increase by 20 or 30 per cent. the bonus on sugar-cane grown by white labour. You will join me, I am sure, in wishing him both a speedy recovery from an illness brought on by overwork, and the success that should attend profound knowledge and skill coupled with tireless devotion to the public interests.

Conclusion.

In conclusion, gentlemen, I have to say that I am pleased with the large attendance of delegates, and that I hope that our discussions will be marked by the good feeling and the seriousness of purpose which were such notable features of the last Conference. I am delighted to see around me to-day many who made that Conference so agreeable a recollection to me. It gives me great pleasure to meet them again. Among those who were not present on that occasion is my old friend and former colleague, Mr. Thynne. I am very glad he is here, and I take this opportunity of testifying to the splendid services he rendered agriculture while a Minister, and of expressing my pleasure at the warm interest he still takes in everything calculated to increase the prosperity of the Queensland farmers, and at the circumstance that in the problems we have assembled to consider we are to have the benefit of his ability and experience. (Loud applause.)

COMMITTEE OF RESOLUTIONS, Etc.

On the motion of Mr. Peter McLean, the following were appointed a committee of resolutions:—Messrs. C. P. Mau (Mackay), H. G. Faithfull (Herbert River), F. W. Peek (Loganholme), J. G. Palethorpe (Toowoomba), W. Deacon (Allora), W. Miscamble (Roma), J. McPherson (Rockhampton), J. Kyle (Bowen), H. A. Jones (Maryborough), C. Marks (Bundaberg), and P. McLean, the last-named to be convener. It was also resolved that speakers discussing papers, &c., be limited to five minutes; the reader of a paper to be allowed ten minutes to reply.

Mr. V. C. Redwood, of the Drayton and Toowoomba Agricultural and Horticultural Society, Toowoomba, then read his paper on—

HOW TO GROW BARLEY FOR MALTING PURPOSES.

[By V. C. Redwood, Drayton and Toowoomba Agricultural and Horticultural Society.]

Soil.—Soil is, without doubt, the first and most important part of the whole question. From all information obtainable, and from my own experience, I have no hesitation in stating that the best barley is grown on light, loamy soil; and it is a noted fact that virgin soil is preferable to any other, as none of the constituents necessary for the production of first-class barley are taken out, and barley grown on virgin soil will decidedly make a superior malt and a better beer. No matter what cereal is grown, many of the nutritive substances in the soil are in part absorbed; so, therefore, virgin soil gives the best results. Putting it in a few words, it comes to this: The farmer gets a more prolific yield, the maltster makes a better malt, and the brewer consequently obtains a better beer. Barley is a cereal that lives near the surface, or, rather, its roots very rarely go down more than 6 inches. Therefore, the most profitable ground on which to grow malting barley is that with a friable surface, as it is more easy to cultivate, and will grow a more suitable grain than that which is grown on a stiff or waxy soil. It is an established fact, in all barley-growing

countries, that barley grown on light land is always more mellow than that raised on a stiff soil; and the more chalky and mellow the land is, the better malt it will make. I have certainly seen barley grown on a strong land which gave a splendid yield and made a good malt, but it is not advisable for any farmer to waste time and money in trying to pulverise a strong waxy soil if it is possible to avoid it. No matter how you cultivate, you cannot produce as mellow a grain, which is what is required for malting, on strong land as on light. I have gone rather more fully than I intended into the matter of soil, but considered it very essential that this important feature in barley-growing should be thoroughly understood by all agriculturists.

CULTIVATION.—The land should be ploughed up early in the year, so as to ensure exposure to the sun and air, which have a mellowing and sweetening effect. In New Zealand and other large barley-growing countries, in most cases, the land is fallowed, and this plan should be carried out whenever practicable. I am a great believer in it, as you grow such a beautiful quality of grain. Before going any further, I will endeavour to explain the process. Plough the land deep, early in the spring, so that it is exposed to the dry wind and heat of summer, which sweeten the soil. Cross plough in March, pulverise well, and sow on a fresh furrow in April or May. If the farmer is going to drill the barley in, he will harrow before he sows, but not if he intends to sow broadcast, the difference being that the drill requires an even surface, so that it can bury its grain. Of course anyone who has any knowledge of farming knows that in broadcast sowing the ground should be harrowed after and not before the seed is distributed. I myself think it advisable to harrow even after the drill, and am a great believer in drilling.

SEED.—To ensure a good quality of malting barley, the seed must be pickled; and this is essential to prevent smut. Barley cannot be properly grown in any country unless the farmers take this precaution. Smut is most injurious, not only to the growth which naturally affects the yield of the grain, but also in threshing, as the grain gets discoloured, and that depreciates its value. The best kind of seed to sow is the pure Chevalier. It is largely grown in all parts. In fact, Chevalier barley is the most widely distributed and best-known variety in the world. It originated from the careful cultivation and selection of the Rev. J. Chevalier, rector of Stoneham, Suffolk. It is now grown most successfully in every country of Europe, America, Australia, New Zealand, and even Chili. It produces extremely heavy crops of friable grain, distinguished by its almost transparent husk, high percentage of starch, evenness and plumpness of kernel, and its great weight. All the best qualities of every class of barley seem combined in this one variety. It gives the strongest extract, and will malt far and away better than any other class. The mode of and proportions for pickling are as follow:—Use 1 lb. of bluestone to every 4 bushels of seed; dissolve in boiling water for immediate use, or in cold water twenty-four hours before the liquor is required. Enough water must be added to thoroughly wet the grain. Spread the seed on a floor, with space to allow of its being turned over. Sprinkle with the liquor and turn thoroughly, so that each grain is wetted. Another common practice is to get a cask or tank if any quantity is to be pickled, and lower a bag or half-a-bag into it as required. A great many farmers think that, if seed is pickled a few days before using, it is injured and not fit to sow. This is a great mistake, as I have seen grain pickled for a month or more and then yield a splendid crop. Another most important feature is to be sure and sow your barley on as fresh a furrow as possible.

SOWING.—I am a great believer in early sowing, and all authorities on barley-growing strongly advocate it. I suppose many farmers will not agree with me on this point. However, by logical facts I will endeavour to prove my assertion right. Early-sown barley has a great advantage over late-sown, as it is rooted and stooled before spring; so that as soon as the winter is over it is off, and gets well developed before the hot sun has power or time to force it to ripen before intended by Nature, and so will grow to perfection and produce that quality which is essential for good malting barley—namely, starch—which, when malted, constitutes the diastose or saccharine matter necessary to make beer. Now, in late-sown barley, the whole process is hurried, and before it has time to come to maturity the hot rays of the sun are forcing it too rapidly, and, in consequence, your barley, instead of developing starch, which is essential for mellow grain, has acquired, by being forced, too much gluten. Using a malting phrase, it becomes steely, glassy, or flinty, and is comparatively useless to the maltster. A great many theories exist regarding the proper amount of seed to be sown to the acre; but, from my knowledge of the soil of this State, I would strongly advise the following quantities:—If drilled, 30 lb. to the acre; and if sown broadcast, 40 lb.; but, of course, no set rule can be put down for this, as the quantity largely depends on the richness of the soil. The seed to be used should be the best procurable, not over twelve months old, and the farmer should

change his seed every second season. It is also advisable to select seed grown in your immediate neighbourhood, if possible. But, still, there is no fear about its growing capacity if it is grown in these States. A common feeling exists that inferior seed will show as good results as that grown from prime seed. This is a grave error, for vegetable life, in my opinion, is the same as animal life, in that, with a weak sire or dam, you are doubtful if the progeny will be good; but, with both father and mother strong and healthy, you get good stock ninety-nine times out of every hundred. Now, I maintain the same points exist in growing barley. If you sow a good bold grain, it throws off stronger shoots, and the stalk is better able to feed its head or ear. There is also another great point to be considered in having the best seed, and that is that, should there be a bad year, the seed that throws off the powerful roots is able to stand more privation than that with weak ones.

Rolling.—This is important. After the barley is about 3 inches over the ground, run the roller over it. No farmer should neglect to do this, as it acts as a soiling, strengthens the straw, makes the growth more regular, and gives a more even surface for the machines to work on.

Feeding off.—It is sometimes advisable, if the growth of barley is very rank, to check it by feeding off; but great care should be exercised not to crop it too close. On no account allow stock on barley in wet weather.

Cutting.—The first point to be considered is, when barley should be cut. Upon this opinions differ. My experience is, that barley should be ripe, but not over-ripe; that is, the grain should have attained its full size, which will take place just before it is hard, and while there is sufficient sap in the straw to prevent shedding. Nothing is gained by cutting barley dead ripe; on the contrary, the quality is impaired for malting purposes, and fully one-fourth of the best grain will be left in the paddock.

Fielding.—Barley should be immediately stooked; if not, some of the grain will be discoloured, and, should rain come, will quickly germinate. The time barley ought to be in the stook depends much upon the weather, bnt it should never be stacked until thoroughly dry.

Stacking.—This is a point that requires great care. The best results, from a malting point of view, are obtained in large stacks, as there is less outside, and the mellowing process is more complete. If barley is not dry when stacked, it will heat, and become mow-burnt, destroying its germinating powers, which renders it useless for malting purposes, as barley must germinate to make malt. It is greatly improved by being kept a couple of months in the stack.

Thatching.—Having built your stack, it is very important to secure it from the rain. This can only be done by using some cover, because barley is not like wheat or oats that can be built to resist the weather. The straw of this cereal is of a soft, spongy nature, and cannot be secured without some protection from the weather.

Threshing.—One may have a perfect sample of grain, and then have it fatally injured in the threshing The revolution of the drum should be at least 200 less than that required for threshing wheat, and the concave of the machine must not be set too close to the drum, or it will break and bruise the skin of the barley and nip the awn off too closely, which renders the grain practically useless for malting purposes. No matter how perfect the grain is, mould must develop during the germinating process. To avert this, in threshing it is far better to leave a few awns on the barley, which are not detrimental to the grain in the slightest degree. If the barley is found to be smutty, do not put it through the "polisher," but through the "screw," as then the smut bladders are not broken, and the grain does not get discoloured, as it would otherwise. Still, there should be no smut at all if the pickling is properly attended to. Barley seldom requires putting through the "polisher." Be sure and open the screen, and take out both seconds and thirds in order to secure an even sample. It must be borne in mind that, if this is not done, the inferior grain has to be taken out at the malt-house, and in purchasing barley the maltster always takes this into consideration; and I can assure the farmers that it is to their interest to have their barley well screened. To do this, it is necessary not to thresh too fast.

Storing.—I wish to call the farmers' attention to this matter, as it is a source of considerable trouble to the maltster. Many farmers store their barley in weevily bags or barns; hence the barley becomes infested with weevils, which are brought direct to the malthouse. I have rejected good samples of barley from this cause. The weevil during the summer months breeds very rapidly, and farmers cannot be too particular on this point.

Bags.—Farmers should invariably use new bags of the best quality, which would be suitable for export, if necessary.

CHARACTERISTICS.—Having explained all that I think is necessary regarding the cultivation and treatment of barley, I will now try to illustrate the characteristics of prime malting barley. For malting purposes, I group the qualities of good barley as follows:—Four essentials, and six non-essentials. The four essentials of barley needed to make first-class malt are: Vitality, condition, maturity, and odour. The desirable non-essentials are: Size, weight, uniformity, colour, appearance of skin, and age. I will now describe the four essentials necessary in barley for the production of prime malt.

VITALITY.—This is the first and most important feature, as, without life, you can do nothing.

By vitality is meant, not only the simple power of growing, but of developing rootlets and acrospire with uniformity. There are many causes which affect the vitality of barley: Irregular growth, arising from varied circumstances prior to ripening; death of germ, caused by overheating in stack; improper storage in barn; destruction by weevil; partial destruction by threshing; and loss of vitality through age and dampness. Barley is no good for malting purposes after it is eighteen months old. It will start germinating on a malting floor, but after two or three days will cease, while to make malt it requires to grow for about six or seven days or even more. Hence the importance of vitality. Next in rank comes condition.

CONDITION.—The word "condition" signifies or embraces the following good qualities:—Softness or mealiness, colour of inside; and also the following bad qualities:—Steeliness, colour of inside, flintiness, humidity, mouldiness (whether acquired in field, stack, or barn), dirtiness, and also damage arising from reaping, threshing, &c.

MATURITY.—Maturity is distinct from age or condition, and refers to greenness, ripeness, or over-ripeness. Now we come to the last of the indispensable characteristics of barley that are wanted to produce first-class malt—that is, good and proper odour.

ODOUR.—Barley that has an unhealthy smell can never produce a first-class malt, no matter how skilfully it may be worked. Sound, pure, untainted barley has a peculiar clean, slight odour, almost imperceptible, and difficult to describe in words. However, once learned, it is ever afterwards readily recognised. Good malting barley should be white and floury. The quality of barley is estimated from its colour—a delicate pale yellow—its plumpness, thinness of skin, and its free, chalky fracture and absence of flintiness of look when broken.

CONCLUSION.—I have endeavoured as far as possible to give my practical experience, gained in a country where barley is the principal cereal grown, and, taking into consideration climatic influences and the nature of the soil, I maintain that in an average season, and by careful cultivation, the Queensland farmers can produce a quality of malting barley equal to any grown in the Australian States, and, on an average, a much higher yield per acre. Barley will pay the producer better at 3s. per bushel than wheat at 4s., as with barley you get a more prolific yield per acre, and can repeat on the same land for years.

Farmers should not hesitate to cultivate this valuable cereal, as there will be a certain market in the future, and I shall be very glad indeed if I have succeeded in impressing upon them the importance of giving their attention to these facts. I trust to remain here many years in the malting business, but the further development of the industry rests entirely in the hands of the farmers. If they grow good barley we can make good malt, and the trade must assume large proportions, with handsome profits to the grower and to all concerned.

DISCUSSION.

Mr. W. DEACON (Allora): I am not going to say much upon the paper beyond thanking Mr. Redwood for his kindness in reading it. Mr. Redwood is an expert in barley, in the manufacture of it at least, and those who grow it, or intend to grow it, should be obliged to him for the facts and advice that he has furnished. It is stated in the paper that it is a very important matter to know when barley is ripe. So it is, but our home experience was that barley was not considered ripe until it had reached the stage known as "goose-necked," or turned down. I would like to know what Mr. Redwood means by sowing barley on the freshest furrow possible, for our experience of cereals hardly bears out what I infer he means. Fallowing, again, is good, but to my mind ploughing land in the spring and letting it lie all through the summer appears somewhat of a

waste of time. One of our great difficulties with barley has been the threshing, and certainly a good deal of barley is spoiled in that operation. We have found that maltsters would not look at some of the barley because it had been awned too closely, resulting in the possible destruction of the germ. Anybody who knows anything about barley will agree with Mr. Redwood in most of what he writes, and I am with him in all what he says with respect to the suitability of the Darling Downs for the growth of this cereal. The recommendation, however, that it be sown in April might be altered to May, for that month seems early enough to me and April rather early. As a matter of fact, the best barley I ever grew was sown in June.

Mr. W. D. Lamb (Yangan): It has given me very great pleasure to hear Mr. Redwood deliver his paper, although there are a few points on which I differ from him, and amongst these is the question of cultivation. He says he is a great believer in ploughing in the early spring, and then letting the soil lie idle all the summer. In a climate like that of Queensland, however, it is doubtful whether that could, in practice, be done, as to keep the land clean all through the summer would cost more than the barley would be worth. I would prefer that a crop of maize be put in, as it would keep the land clean without hurting the soil or in any way lessening the value of the subsequent crop of barley. Mr. Redwood states that from 30 lb. to 40 lb. of seed per acre is sufficient, but in my experience I have found out that you require a bushel per acre and perhaps more. As for stacking, I may say that nine-tenths of the barley grown on the Downs is never stacked at all, and Mr. Redwood must admit that himself. Yet it finds its way to the malt-houses. It is all very well to put barley into stacks, but the question is whether it will pay. My opinion is that you should get rid of your barley as quickly as possible—that is, of course, if the maltster will accept it, and this he does at the present time. It has to be admitted that a good deal of barley is spoiled in threshing, but it requires a man to know what he is about to thresh barley so that it will be suitable for a maltster. As for the malting business itself, that is, of course, beyond the practical farmer's sphere altogether, but I must congratulate Mr. Redwood on the manner in which he has brought the matter forward, and I trust he will take the few remarks I have made in good part.

Mr. J. J. Daniel (Pittsworth): As our machinery is constantly improving, I would like to ask Mr. Redwood what his objections to harvesters and strippers are.

Mr. A. H. McShane (Toowoomba): In his first paragraph, Mr. Redwood states that virgin soil is preferable to any other. I believe it is. Then he says you can grow it for many years running on the same land, but personally I do not think it is fair to any land to grow barley on it for several years in succession. In fact, I have seen the evil effects of such a system visible after barley had been sown on land three years running.

Mr. Fred. Smith (Crow's Nest): Mr. Redwood states that he believes it is preferable to cut barley a little bit green rather than have it too ripe. I have had a good deal of experience in barley culture, and, as Mr. Deacon says, in the old country we always used to allow it to grow till it was goose-necked. Here, however, you cannot let it get as ripe as they do in the old land, but I find that if you cut it too soon the gluten of the barley is spoiled. Instead of becoming mealy, as a barley should become when it ripens, it gets flinty, and that is why in the threshing it flies, which it would not do if it were soft and mealy. Mr. Redwood states that you can grow barley on the same land for several years. In my experience, however, you can grow it for two years on the same land, but if you try it a third it will be found that the grain gets very small.

Mr. V. C. Redwood (Toowoomba): Mr. Deacon asked what I meant by my advice to sow barley on as fresh a furrow as possible. By that I mean you must not plough your land and sow the seed a couple of months afterwards without the land having been touched in the meantime. I mean that as soon

as your land is in a fit state, and you have ploughed it for the last time, that you should sow as soon as possible on that furrow. Barley is not a subsoiler like wheat, or a scavenger like oats. It is entirely a surface plant, and you do not want your pulverised soil to be dried in the sun. Some criticisms have been made on my remarks relative to cutting, but if my paper is referred to it will be seen that I do not recommend that barley should be cut green. I said that barley should be ripe, but not over-ripe—that is, the grain should have attained its full size, which will take place just before it is hard, and while there is sufficient sap in the straw to prevent shedding. Any farmer knows that growing barley in New Zealand or in Europe is a different thing to growing it in Queensland. You have a much moister climate there than you have in Queensland, and if you let your barley get dead ripe here the straw gets dead rotten, and the best of your grain will fall out as soon as it is handled. Therefore, I consider that if you want to protect yourselves you will be wise if you adopt the advice on this point given in the paper. The fact is if you cut your barley when it is too ripe you will lose your grain. Of course, you do not want to cut it green, and I do not suppose that any farmer would do that. Mr. Lamb raised the question of stacking, and also objected to the fallowing that I suggested. I only have to point out that if he will take two pieces of land, fallow one and crop the other, he will then see what fallowing will do. I have seen land in New Zealand that has been worked for years, and would practically grow nothing. By fallowing, however, the owners were able to get splendid crops. Fallowing sweetens and mellows the soil, and you will find that your barley will be much more prolific on fallowed land.

Mr. LAMB: You will get more straw.

Mr. REDWOOD: I do not think so. A difficulty with malting barley sometimes purchased by me has been caused through the seed having been sown too thickly. The resultant grain has been too small. What we want is a bold, plump barley. We can produce it, and we are now getting into a stage that our barley will be equal to any grown in Australia. I have watched this industry gradually grow from 25 bushels in 1896 to this year, when, I believe, there were pretty well nearly a quarter of a million bags of barley grown on the Downs. Mr. Lamb's remarks on stacking were to the effect that most of the barley came to the maltsters just threshed from the stook. I do not deny that a large percentage is to the detriment of the maltster. Barley should be stacked two months. If this is done, it will grow when malting more regularly. You will produce a much superior malt from barley that has been mellowed in the stack than if it is threshed straight from the stook. Another important point is, stacking obviates the necessity of farmers rushing the market with their barley. At present we get all the barley in within a period of about six weeks, and to handle it in that time necessitates a rather heavy expense. By stacking, the value of the barley would be improved, and the farmer would get a better price for it both on account of that improvement and also owing to the fact that the market was not suddenly flooded. A gentleman asked the objection to the stripper. From what I have seen of the stripper, so far as barley is concerned, I may say that its disadvantages have been largely caused by the improper handling of the machines. Most of the stripped barley that comes to me has been bruised and knocked about, and is practically unfit for malting. However, I believe in stacking for the reason that you get a better malt. Moreover, barley straw is valuable, and with the stripper you lose this. Again, with the stripper you have to run risks. You have to let your barley get dead ripe, and if a heavy wind springs up you are liable to lose a great deal of it.

ELEVATORS AND THE STORAGE OF GRAIN IN BULK.

This was on the programme as a subject for discussion, and the debate was opened by the Hon. A. J. Thynne, M.L.C., representing the Chamber of Agriculture, Brisbane.

Mr. THYNNE: There is a gentleman on the Downs who has grown 4,000 bags of wheat this year, and the cost of the bags alone for that crop, without taking into consideration the question of labour, will be about £100. If you put it that the wheat crop for Queensland is 1,600,000 bushels, that will give an actual cost to the farmers this year of £10,000 for bags alone, and I want the wheat-growers of Queensland to understand that this money can be saved; £10,000 saved to the farmers means interest on a sum of from £200,000 to £250,000, and that is more than would be wanted for the erection of all the elevators required in Queensland. Some years ago I ascertained from the Railway Commissioner the cost of bagging the maize crop at Laidley; £750 was considered a low estimate for the cost of bagging one crop for one season. When I got an estimate of the cost of an elevator to hold 30,000 bushels I found that it could be erected for from £750 to £800. These are the problems which have induced me ever since I saw an elevator working to keep this matter before the farmers of Queensland. The farmers' profits are not too big at any time. Farmers have their troubles, and even if we have an extra good season there is generally not lacking some drawback to pull down the average. It is not merely the cost of the bags that makes this question of elevators one of such increasing importance. When you come to count the number of times that a bag of wheat, or a bag of maize, or a bag of barley, is handled from the time it leaves the thresher until it gets to the consumer, I do not think our total will be much less than ten. You have to take it from the thresher, put it in the barn, carry it to the railway station; then it has to be loaded, unloaded at its destination, and so on. I think, when mentioning that the bag of wheat is handled ten times, a low estimate has been quoted. If it is exported as we exported maize some time ago, I do not believe the bag is handled less than sixteen times. The farmer bears every penny of the expense of every one of those handlings, and, calculating the cost of those handlings at ½d. a bag for every time one takes place, there is another 5d. per bag added to the cost of the wheat through our present system. Practically the same is lost with our maize crop. In fact, taking into consideration the cost of both bags and handling, I think I am not exaggerating when I say that there are £20,000 going out of your pockets every year for these items. Twenty thousand pounds would be sufficient to put up all the elevators necessary to take all the Darling Downs wheat crop, not including one large elevator to cost about £5,000 and to hold 1,000,000 bushels. With the elevator system you get your wheat stored, cleaned, graded, and certified to as to quality. I have seen farmers in Toowoomba carrying little sample bags of their wheat round the town trying to get prices from one mill after another. Their difficulty was that they did not know the real value of their wheat. With the elevator system and proper inspection, which is necessary in all elevator systems, both the millers and farmers have a competent person to decide the value and grade of each comparative class of wheat. In that alone there would be a saving of time to each individual farmer, and the time hitherto spent in endeavouring to sell wheat could be utilised on the farm to more profitable account. It is for these reasons that I have always been most anxious to see the farmers of Queensland introduce this elevator system. In other places the introduction of the system has effected such a saving—a saving of 10d. a bag according to our cost—as to make a fair profit to those who grow the wheat and a fair profit to those who buy it. And when you come to compete with countries that have these facilities, you will find yourselves so handicapped without them as to practically leave you at the mercy of your rivals. What is an elevator? A little elevator of 30,000 bushels is only a two-storied shed, built fairly strong, and Queensland does not lack good hardwood. It consists of an upper floor with 60 bins, containing an average of 500 bushels for each bin. There is a row of 6 bins across and 10 rows—*i.e.*, 60 bins. A farmer, if he has 500 bushels, takes 1 bin, or, if he has 3,000, he can take a row. Instead of having the labour of humping each bag and packing it in his store, all he does is to carry his crop in bags, boxes, or whatever he likes to the elevator, dump it into a trough, and

the whole of his crop is taken into the bins upstairs. Any of you who is interested in the question of elevators can see the idea in operation at Mr. O'Brien's mill, in this town. You will see what a simple thing an elevator is. It is simplicity itself, and in fact it is like using a Californian pump to pump up water. There are many objections offered to the adoption of these elevators in Australia. It is said that the idea is premature; that we have no export trade. But what is the fact in other countries? All the grain that is grown in the United States and Canada is handled in elevators, and 70,000,000 people consume an immense quantity of grain. If there was no export trade from America in maize, wheat, or barley, the elevator system would go on just the same. Some time ago in New South Wales there were three elevators in use by private individuals. There is one attached to a private mill in Sydney with a capacity for 75,000 bushels. Gillespie Brothers, again, have an elevator with a capacity of 70,000 bushels. A system of elevators for this country would entail the erection of one elevator of 1,000,000 bushels at, say, Toowoomba, and then every wayside station on the railway lines leading to Toowoomba, in the districts where there is a considerable quantity of grain-growing, should be supplied with elevators with capacities of from 30,000 to 40,000 bushels. The American cost of a million-bushel elevator is £5,000—that is, the original cost of such an elevator is about 15d. per bushel. £1,000 is an estimate for a 30,000-bushel elevator, and I do not think I am far wrong when I say that £100,000 would fit the grain-growing districts of Queensland with a complete system of elevators. A cost of £20,000 is incurred every year to the farmers of Queensland for bags and the handling resultant from the use of bags, and that £20,000 is one-fifth of the total cost of establishing such a complete system as indicated. I had the privilege of addressing the first of these Agricultural Conferences, and when I addressed the delegates then present I told them that the Government of the day was prepared to initiate a system of grain elevators for the grain-growing districts, but that the Railway Commissioner wanted some assurance from the farmers themselves that their construction was desired. The one thing that has been missing since then is the consideration of the subject by the farmers and the making of the request. I do not know how long that apathy is to last, and my object now is to urge the matter upon your attention. I could not get a better audience than the present, and it may be that I shall not have such another opportunity of broaching the subject. I can only say now that, apart from the direct interest to the existing farmers in the grain-growing districts, I look to the introduction of this system not merely to give farmers generally a greater power and control over their own produce, and I look to it as likely to lead to a great extension of the grain-growing industry, both because it will make that industry more profitable and because it will permit of more time being devoted to other work on the farm. Although it is rather late, I should like to read a short introduction on this subject by Dr. N. A. Cobb, of the New South Wales Agricultural Department. No man has done so much in Australia for profitable and scientific wheat culture than Dr. Cobb, and if his views were adopted with regard to grain elevators I am expressing myself but poorly when I say that enormous benefit would accrue to the wheat-growers of Queensland:—

When I see a farmer go to his nearest market town, several miles distant, pay 5d. each for bags by the wagon-load, take them home and put them away in a dry place until wanted, then once more carry them out into the field, fill them with grain, sew them up, and, if he is a careful man, label each bag separately, lift the bags of wheat on to a high dray, take them to his barn, unload them, stack them, and later on lift them down again, rip them open, clean the grain by machinery, bag it up again, label the bags again and stack them once more until such time as the market price suits him; when I see him, having made a sale, unstacking them once more several weeks later, sewing up the holes the mice have gnawed meanwhile, lifting them again on to his high dray, and off again, one by one, at the railway shed; when I see the grain leaking out through bursted, torn, and gnawed bags all the way from the railway shed to the seaboard; when I see bags of precious grain, representing the

income of farmers in all parts of the country, standing days at a time, exposed to the wet weather and losing value, simply because grain in bags cannot be handled fast enough to prevent a glut in the metropolitan or other central market; when I see valuable property, such as railway trucks, standing idle day by day, letting interest on the people's money go to waste, because these trucks cannot be loaded with bags of wheat quickly and despatched to their destination; when I see thousands of bushels of uncovered bags of wheat caught in a shower; when I see the wheat, after several hundred miles railway journey unbagged, and put into fresh bags before transhipping, because the original bags are worn out; when I see them again lifted, and lifted, and lifted slowly into the ship's hold; finally, when I lean back with a shudder and try to imagine the high old time the ship's rats and the weevils have among this honeycomb of bags of wheat—a picnic lasting, it may be, several months—until the grain is at last unloaded in London, and shot into an elevator—when I see all these things, I cannot find words powerful enough to stigmatise this universal use of bags. Because this thing is wrong in principle, and can be remedied. The secret of the remedy—no, it is no secret; it is fairly written against the sky in scores of the greatest and most prosperous towns in America and Europe. Not the secret, then, but the principle of the remedy is this: *Threshed grain can, in a large measure, be handled like water.* It will run, it can be poured, it can be pumped; and if only our farmers, merchants, and railway architects will take pains to consider this simple idea, the result will be a change in our methods of handling grain, beginning in the field and ending in the mill. What would you think of a man who lifted all the water out of his well in a bucket instead of with a pump? What would you think of a man who lifted all the water out over the edge of a tank instead of letting it run out through the faucet at the bottom? What would you think of a man who habitually carried water downhill instead of letting it run through a spout! What would you think of a man who, having 400 gallons of water to transport, put it into 400 one-gallon receptacles instead of into one 400-gallon tank? What would you think of a man who caught his roof water in an underground tank, so as to have the pleasure of pumping it up again when he wanted it for use? What would you think of a man who preferred to store his water in a way that not only allowed but actually invited various sorts of vermin to injure it, and cause it to leak away? The English language is hardly strong enough to tell how big a fool such a man would be. Yet, observe how grain is handled in Australia. It is lifted by hand, when to lift it by simple and inexpensive machinery would be both easier and cheaper. It is lifted over the edges of receptacles instead of being allowed to run out of them at the bottom; it is habitually carried downhill instead of being allowed to run of its own accord. When being transported by the thousand bushels, it is cooped up in 4-bushel receptacles. It is everywhere put down so as to be lifted again by hand at the next handling. It is preferred to store it in a way that not only allows but actually invites various vermin to injure it, and cause it to leak away.

On account of the lateness of the hour I shall not read any more of the article, but I may tell you that this is what I have seen with my own eyes. At Fort William there were three elevators belonging to the same company, each with a capacity of 1,500,000 bushels—that is, the three of them had a capacity for 4,500,000 bushels. Each could handle 300,000 bushels of wheat per day. They unloaded it from the railway trucks, cleaned and graded it, weighed it, and, if necessary, they would load it into a ship's hold. The charge for the whole of that work was, as I was informed, half-a-farthing per bushel—that is, half-a-penny per bag. To handle that 900,000 bushels per day, there were one engineer, one fireman, and five men to each elevator, and, with the exception probably of the fireman, not one of those men were doing what you could class as manual labour. The whole thing was done mechanically. With a charge of half-a-farthing per bushel the company was paying a handsome dividend, and it was a sight to see the loaded wagons of wheat waiting their turn to be unloaded by the elevator. It was a sight no Queenslander could look at unmoved, and I can only wish that I had the power to so describe the effect it had on me as to have each one of you affected as I was. I am sure that if the suggestion, that I had the pleasure of hearing—that two or three of the observant farmers of Queensland be sent on a mission to see the things that they could learn for use in this country by a short visit to Canada or the United States—were adopted, it would be an extremely profitable one to Queensland. It would not be left to one who is not a practical farmer to have to stand up and urge upon our growers the importance

of this question. I am sure that if it were put forward by a practical man it would not be long before we would see the introduction of the elevator system. When it is to be introduced, however, will depend upon you. A gentleman has asked whether the Railway Department would build special wagons to convey the grain to the elevator. I think they would, and, moreover, I think that it would pay them. The system would effect an immense saving in rolling-stock, and this, again, would justify an application on the part of the farmers for a reduction in freights I believe the position in Queensland as regards this elevator system is pretty much the same as it was five years ago; and I have no doubt whatever that if the matter were pressed, and if you farmers express a desire to have the system introduced, it will not be long before you have it. Is it too much to ask you to help to get it into operation by the season after next? One thing I forgot to mention. When the wheat has reached the large elevator, where it is cleaned, graded and weighed, the farmer gets in exchange a warrant for the quantity of wheat he has sent in. Then if he wants to sell at current market rates he hands his elevator warrants to a selling broker and gets the cash within twenty-four hours. If he does not wish to sell, and yet needs some cash, the bankers are glad to advance liberally on the deposit of the warrants. He is free to dispose of his crop when and how he likes, and if there should be any hitch with the buyer as to the quality or quantity the elevator people have to bear the brunt of that.

Mr. L. J. MOODY (Geraldton) asked if Mr. Thynne could give some idea of how the wheat is taken from the thresher to the railway station.

Mr. J. TROTT (Pittsworth) said he was rather at a loss to see how the system is applicable to the whole of this State. Although he was in favour of it, it must be remembered that many of our farmers were unfortunate enough to be from 15 to 30 miles from a railway station, and the difficulty with them is to get their produce to that station. It would be almost impossible to deliver their wheat in bulk at a terminus on the railway. Their threshing was generally done by contract, and the farmer had his 100 or 1,000 bushels threshed in a very short space of time.

Mr. H. A. TARDENT (Dallarnil): I hope that some resolution will be passed by the delegates strongly recommending some practicable scheme for the inauguration of elevators here. I think they should be started by the Railway Department. They can be started first of all as an experiment, and then they can be extended all over Queensland, for if they are a success for wheat they will be a success for maize and the other grain crops of the State.

Mr. V. C. REDWOOD (Toowoomba): Although a strong believer in the elevator system, I would like to point out that it will take some years before it can be established here. Mr. Thynne hopes that it will be before another two seasons, but I think it will be at least three. In the first place, the farmer must have shed accommodation. It is all right for those alongside a station to cart their wheat direct to the elevator, but those who live 20 miles away must have a shed. There is no doubt that we are progressing in the growing of cereals, and that we must have a cheaper method of handling. There does not seem any other way out of the difficulty than by the elevator system, but I believe, with Mr. Tardent, that the Government should build the elevators, provided, of course, that the Government is satisfied that the farmers will support them after they are constructed. If we organise and prove to the Government that it will pay them to build elevators, I think we shall have gone a long way towards getting the system inaugurated. It should not be hard to prove that the elevators would be remunerative, for, in the first place, the Railway Department would probably require only a third of the rolling-stock that it now uses in connection with the transport of grain; again, in unloading the system would be of the greatest value to both millers and maltsters. These latter would be able to handle the grain they purchased much more cheaply, and the farmers would share in the saving effected thereby. I shall do all in my power to help the elevator system, and I think we should start to organise

on the subject right away. Let us get plans and estimates of cost, and form small elevators in the principal growing districts here, and I believe that if we do that the Railway Department will render us all the assistance that we may require. Unless we help ourselves, we can hardly expect any support from the Government.

Mr. A. W. Cameron (Maryborough): The margin of profit in farming is so small that every penny saved in harvesting a crop is an important matter to the grower. There is not the slightest doubt that the present system of handling grain is a matter that touches the pockets of our agriculturists, and I think, if we can arrange so as to be able to handle our cereals in bulk, that after a few seasons we will be wondering why the system was not adopted before. As far as Government assistance is concerned, the farmer will have to make representations to the Government first that he is prepared to support the system. Let any number of farmers approach the Government, and say they are prepared to adopt this system of handling grain in bulk, and I am sure that the Government will very quickly meet them, and have elevators erected. It appears that elevators are paying concerns, and that the proprietors of them in America make money. If you can show the Government that they will make interest on the project, I am satisfied that they will very soon find money to build the elevators. Of course they are not going to put up buildings to remain empty year after year. The question was asked whether the Railway Department would be likely to provide suitable trucks. The Government provide trucks to handle coal, and they make special trucks to handle the juice from the Doolbi Mill, in the Isis, and convey it to the Millaquin and Yengarie sugar-mills; so why should they not construct special trucks to handle grain? In fact, there would not be any necessity to build special trucks at the beginning. The juice-mills are not using these large tanks just now, and it has struck me that these juice tanks would be excellent for handling grain in bulk. The question is, how the farmer is going to handle the grain on his own farm. I am not a wheat-grower myself, but I have listened intently to the discussion, and it appears that, instead of having bags to take the grain away in, you could have hoppers or drays. Pine is not a very expensive timber, and a special dray could easily be constructed for conveying the wheat to the farmer's barn. You could easily have a little elevator on your own place, and, when you come to consider the cost of bags, I believe you would find that that cost would more than pay the cost of interest on the erection of a small elevator on your own farm. I hope that the farmers, in their own interests, will see their way to save as much as they can for themselves, for every penny that they can save in harvesting a crop is so much more for them to expend in another direction.

Mr. G. Moulday (Allora): Whatever benefit we may get from elevators, we shall still have to bag our wheat in country places. When the thresher comes you have put into your hands perhaps 200 bags a day; and how is a single farmer going to deal with a quantity like that in its loose form? You must bag to get the wheat from the farm to the elevators wherever they may be stationed.

Mr. W. Deacon (Allora): I was going to say a word about dealing with the wheat as soon as it comes from the thresher, but Mr. Moulday has already touched on that point. Say you get 300 bags of wheat from the thresher: that means 30 or 40 tons, and a farmer with one or two drays could not convey that in one day to the elevator. That means that the bag is not done away with. Mr. Thynne has, perhaps, done more for the agriculture of the State than any other man in Queensland, and I very much regret that he is not in another place, where he might render us very great service. However, there are two propositions before the farmers on the Downs with regard to wheat storage. The Toowoomba Chamber of Commerce formulated a scheme by which there should be storage sheds on every station on the lines where they grow wheat. That is to say, there should be a shed, with a man in charge, and the farmer should be able to store his grain, at so much per bag, until he wanted to sell out.

It was also thought that the bags should not be mixed. That is a very good plan, and if the wheat farmers of the Downs were polled I think they would vote for that system in preference to elevators. But, still, Mr. Thynne is in advance of that, and his system of elevators appears to be practicable. These small elevators he speaks of would not cost more than £800 or £900, and I really cannot see why the system cannot be brought into operation. Of course the bag will have to be used in the conveyance of the wheat from the farm to the railway station, and I advocate the use of the 2-bushel or Californian bag instead of the 4-bushel bag. Just look at the chaff bag and the old chaff bale. No one would go back to the old bale now that they have the chaff bag. If you once had the 2-bushel bag, you would never go back to the 4-bushel. Our present bags were made to suit the old bushel measure, but when you have a small spout to pour the wheat into the bag I do not see why we now want a bag with a 2-foot mouth. There would be less sewing, for one thing, if we had a smaller bag. It must not be forgotten that the Government have promised to put up an elevator as a trial on one of our stations on the Downs. They promised us that when Mr. Thynne read his paper down in Brisbane, and I hope they will be kept to their promise, although it is a mistake to think that we want money from the Government. We are prepared to pay the Government fair interest on their money; and storage sheds, as well as elevators, would pay good interest on their cost. One thing I would like to mention here, although it may be somewhat foreign to our subject, and that is, the necessity for the periodic checking of the scales in use at our country railway stations.

Mr. W. ATKINSON (Danderoo): Until recently I was rather against elevators, because of the necessity for handling the grain between the farm and the railway station. The difficulty, I think, could be overcome, however, by the thresher putting the wheat straight into an elevator. It already puts the straw into an elevator, and why not the grain? It would not cost much to construct such buildings on a farm, and I think I could put up one on my place, to store the wheat I grow, for less than £100. A farmer who grows 2,000 bags of wheat a year could well afford, if necessary, to put up four of these elevators. The expense of handling after that would be very little, and the saving of expense on the railway would be very great. The cost of bags is a big item. A farmer has to pay 6d. for every bag he uses, and the expenditure is a dead loss, as he never sees the bag again after he has sold the wheat. If the elevator system had been in operation in Australia before wheat-growing started in Queensland, the probability is that we would never have thought of bags in this State. The immediate expense of introducing elevators is a drawback, but there is such a thing as taxing an industry for its own benefit, and we all know the benefits that have accrued to the meat and dairy industries through the operation of the Meat and Dairy Produce Encouragement Act. If the Government are going to take this matter up, I think they will have to tax the farmers to provide funds for the erection of elevators. Supposing a tax of 1d. a bushel is imposed. That may be a big tax, but it only means 4d. a bag, and that does not mean the cost of one bag for one season's supply.

Mr. FRED. SMITH (Crow's Nest): In England these elevators are called granaries or grain warehouses. They are built beside a river or a railway, and the farmer's wheat is shot into bins. With respect to the difficulty that has been raised relative to the conveyance of the wheat from the farm to the elevator, I may say that in England there is a bag company, and the same people who own the elevator will also own thousands of bags. When you go to the owner of a thresher you will apply for 100 or 1,000 bags, as the case may be, and these you have the loan of for a number of days at ½d. per bag. Of course if they are not returned within so many days you have to pay another ½d. When you have used your bags for the conveyance of the grain to the elevator you return them and they are rented to the next man, so the question of bagging in considering this elevator question need not frighten anyone. One advantage of the elevator system is, that a good many people in this

country have not too much storage room. It would be a great advantage to them were they able to place it in an elevator till prices suited, rather than to have to rush it on the market.

Mr. W. Nott (Biggenden): It appears that all these elevators are built on the bin system, and I would like to know if the grain is stored in one of the bins for any length of time whether it can be protected from weevils. Is wheat liable to the attacks of insect pests when stored in elevators?

Mr. J. J. Daniel (Pittsworth) said the inauguration of elevators would be a step in the right direction, but he also saw a difficulty in the carriage of the wheat from the farms several miles from the elevators. He also spoke of the difficulty of getting the grain from the harvesters to the bins at the railway station, and asked how farmers who grow a small quantity of wheat could utilise the bins. Could a farmer who has only a few bags of wheat occupy a bin for a whole season? We grow a great variety of wheats. A farmer may grow Talavera, or Pearl, or Allora Spring; would he be allowed to occupy a separate bin for each variety?

Mr. W. D. Lamb (Yangan): I am a wheat-grower, and have had considerable experience in the handling of wheat, which experience has led me to the belief that the elevator system would be an admirable one for either maize, wheat, or barley. Instead of bins, however, I would favour the bulk system. If we had an expert in charge of the elevator he would classify the grain and bulk it accordingly. I agree with what Mr. Thynne has told you about the value and use of a certificate issued to the grower that he held so many bushels of wheat of such and such a quality. One advantage of the elevator system is the doing away with a lot of heavy manual labour, and I am sure that every farmer and farmer's assistant would take more interest in his work if there was not so much heavy toil associated with some forms of it, such as is entailed, for instance, in the handling of grain. With respect to the freedom or otherwise from weevil and other vermin of grain stored in elevators, I think if we had the grain in bulk we would be better able to guard against the depredations of weevils and similar pests. As for the difficulty of carrying the wheat from the threshing plant to the elevator, I think box wagons could easily be constructed to enable the wheat being conveyed from the thresher either to the station or to the farmer's own house. The trouble is one that ought to be easily overcome.

Mr. R. Sumner (Zillmere): I believe it is hard to grade wheat, owing to the number of varieties in cultivation, but it is probable that a time will come when this number will be considerably lessened. At present I believe it is almost impossible to grade the wheat on the Downs from this cause. Elevators will have to come—that is, if Queensland is going to be a wheat-producing country. Anyone who has seen wheat from America or Russia unloaded in England will recognise this.

The Hon. A. J. Thynne: I am exceedingly flattered at the very kind way you have received this subject, and I am encouraged that some practical outcome will result from the discussion that has taken place. The questions that have been asked indicate that there are three main points on which doubt seems to exist. One of them is the getting of the wheat from the farm to the railway station. I shall tell you how the farmer in America does it. In his barn he has his own bins of a size sufficient to meet his expectations of a crop. He gets a thresher and sends his grain straight to his bin. One gentleman spoke of a farmer who perhaps had to carry his wheat 30 miles to a railway. There are advantages and disadvantages in every man's position, and he has to deal with them according to that position. The American farmer gets his grain into a bin large enough to hold his whole crop. He does not use many bags, although he may use a few for the purpose of carrying his grain from the thresher to his barn. The main thing is he does not use bags for storage purposes. We next come to a different practice to what we see in Australia. You all know the American wagon—the long, low, flat-tyred, lorry-shaped wagon which is used almost universally for farm purposes in America They

build there a special grain wagon, which costs about £10, to do nothing but haul grain. The cost is not much, and many farmers find they can afford to get special grain wagons and put them away in the off season. But that is not what is recommended, for in America they build a box to suit the size of the bottom of their wagons. Suppose it is a 12-foot wagon, they build a box 4 feet by 12 feet by 4 feet, and this will hold a lot of wheat. They take these boxes alongside the thresher, and the thresher pours the wheat straight into the box. The wheat itself is not handled. At the end of the box there is a sliding door, and by opening that trap you can arrange that the whole of the wheat will flow out and go in whatever direction the farmer desires. If he has a little elevator of his own, and one can be erected for about £8, he has a few drays going and takes his wheat direct to it. One of these small elevators, costing the sum I have mentioned, can be worked by hand, or rather horse-power, and is preferably built at a little height, so that a horse and dray can be backed underneath it. When the time comes when he wants to bring the grain to market or to the railway station elevator, all he has to do is to open a trap door at the bottom of his elevator, fill his box, and then close the trap. Afterwards he can take away another load. He can go on like this for a week or a month—the principle is the same whether it takes two or three hours or two or three weeks. The same saving in labour is effected every time. There is nothing in the elevator system to restrict a farmer adopting any means of carrying wheat which he finds most convenient. He can carry it in bags or boxes. He can keep on handling bags, and the elevator system will not stop him from so doing. No one seems to have raised any difficulty in connection with the elevator itself, and I can assure you that you need not anticipate any trouble in the details of its working. With respect to appealing to the Government, I have always been one of those who do not like appealing to the Government for everything, but here, in the carriage of material on our railways, I regard the handling of grain in the most convenient form as a part of the system of railway carriage, and that the people who have control over the railways ought to provide facilities for handling grain as they do for handling anything else. I may remind you that five years ago, on behalf of the Government, when I was a Minister, I told the Conference that the Government were prepared to do something if the farmers only asked for it. Do not throw it back on the Government again without a request from yourselves that the thing should be done. One gentleman asked how the small farmer was to benefit from the system. We cannot provide for the man who only grows one bag of wheat or half-a-dozen bags, and we must not all stop behind for him, but I think there are few men who grow much less than 400 bushels in a season, and it is hardly fair that we should be called upon to make special provision for a man who produces less than that. If there are such men, they should combine amongst themselves. The wayside elevator is a small elevator; it is one holding 30,000 bushels, and is divided into sixty bins. One farmer may hire room for 500 bushels, or he may take a row of bins. These wayside elevators, however, are not intended to be storage elevators, the storage room of which is to be held by certain individuals for a whole season, and thereby keep everybody else out. The wheat is only to be there until such time as arrangements can be made to take it away, say, to the central elevator. For the wayside elevator there is no need to clean your grain. You can put it in as dirty as you like, but when it goes to the central elevator it is there thoroughly cleaned for you, graded, and weighed. It is from that central elevator that you get your ticket as to what quantity you have stored. Once your grain gets into the central elevator you never see it again. Some people have such an affection for the particular grain they have seen growing in the field that they do not like to be separated from it, but once wheat gets into the large elevators it is graded by a recognised and competent person, and is then bulked in large bins. There is no longer a separate bin kept for each farmer. He gets in exchange a certificate showing he is the owner of a certain quantity of wheat of a certain class, which is like the old system of bond warrants.

The third point referred to by delegates is the danger from weevils. Practical experience has shown that there is less danger to be apprehended from insect injuries in elevators than in bags. If weevils are found in a bin or in a number of bins, how much more easily can the wheat be handled and cleaned? Some people use formalin gas to destroy insects; some use bisulphide of carbon. Some of the elevators adopt this principle. If there is a disposition on the part of the wheat to get mouldy, it can easily be handled, aerated, and dried by being poured or changed from one bin to another. The wheat is aerated by the cleaning which it gets, and this has an excellent effect on any insect pest which may be present in it. Another point that has been raised is the number of varieties of wheat grown on the Darling Downs—a fact that shows that wheat-growing on the Downs is still in an experimental stage as regards the best varieties to be chosen. It is a thing, moreover, that we must not allow to dominate all our proceedings in connection with the product of the wheat crop. If a farmer has 400 or 500 bushels he can put it into the bins of the wayside elevator, and he can afterwards do what he likes with that particular wheat. The miller will mix all these wheats together, and if you get one or two capable men who are expert in discriminating between the values of the different qualities of wheats I think we shall arrive more rapidly than we are at which are the best kinds of wheat to grow in Queensland. Every form of grain can be handled by the elevator. You can clean, grade, and store maize in exactly the same manner as you can wheat, and everything I have advocated to-day in connection with wheat is applicable to any other form of grain.

Mr. J. J. DANIEL (Pittsworth): I may be out of order, but I have much pleasure in moving that we express our appreciation at the very able way in which this subject has been placed before us by according Mr. Thynne a very hearty vote of thanks.

Mr. Daniel's suggestion was adopted with acclamation; and the whole question of grain elevators was then referred, on the motion of Mr. ATKINSON, of Danderoo, to a committee of wheat-growers to meet after the conclusion of the session.

SECOND SESSION.

TUESDAY, 10TH JUNE, 1902, 9·30 A.M.

The first paper read was one by Mr. JAMES LINDSAY, of Woombye, entitled—

THE FRUIT FLY.

Those of us that follow fruitgrowing as a means of living have a great many foes to battle with. We have flying foxes, numerous kinds of scale, several species of fungi, marsupials, fruit inspectors, and last, but not least, the lively fruit fly. I don't think there is any branch of the agricultural profession in which there is so much attention and constant battling required to keep insect pests in check as fruit-growing. It requires the grower to be constantly, the whole year round, looking after the fruit trees, to keep them at all free from fungi and scales; especially does this apply to the orange-grower. Then, when the fruiting season begins the fight against the orange bugs commences; and, lastly, when the ripening stage is coming, the nimble fruit fly starts on its career of destruction. There are two kinds of the fruit fly—one is dark and plump, the other yellow and thin; but whatever difference there may be in their appearance there is no difference in their nature. Their habits are the same; their methods of working through the largest number of oranges in the shortest space of time are similar. They both know how to choose the finest fruit and the best for propagating purposes as well as any fruit expert. In fact, I don't see any difference in their qualities. They are both thoroughly bad, and worthy of our best attention to effect their destruction by every means in our power. The fruit flies are becoming more widespread and more numerous every year. It is only within the last five years that I have been troubled to any extent by the fly. Previous to that, I did not know what a fruit fly was, and never suffered such losses of fruit as I do now every year. During the season of 1900 I suffered very much by the fly, losing fully 300 cases of fine fruit, and last year I lost heavily. Now, the loss of 300 cases to a grower is a great pullback, for besides losing the fruit there is the further loss of from two to

three hours per day gathering up and burning or boiling the fallen fruit. Thus, taking the loss of fruit and the loss of time together, these represent a big loss caused by the flies. It knocks the gilt off the gingerbread, as the saying is, to see the fruit of one's industry destroyed by insignificant little insects, and to have to stand by powerless to prevent them in their work of destruction. A man may remark that he owns all the fruit in the orchard, but the fly, if it could speak, no doubt would reply—"Mr. Pricklethorn, as soon as I have had all I want, you can have the remainder." The fly certainly has possession, and makes the most of it. It is no believer in the eight-hour system; it simply works during the whole twenty-four hours, and keeps on until it dies. I am afraid a great many of us fruitgrowers are a good deal to blame for the fly trouble having assumed such large proportions as it has. A great many of us actually cultivate fruit flies by allowing our fallen fruit to remain on the ground and rot there. each orange thus being a nice nest for producing flies. I daresay each orange would contain from twenty to forty maggots; so it can be easily seen that, if we let the fallen oranges of several acres lie and rot, we raise an immense crop of flies and bitter anguish for ourselves. Common sense ought to tell us our duty to ourselves and to others. We cannot plead ignorance. We have been told over and over again by Mr. Benson and others to destroy by burning or boiling our fallen fruit, to destroy all useless fruit trees that have gone wild about the farm, such as guavas, peach-trees, &c.; but we take no heed—we let everything go on in the happy-don't-care kind of style until the flies set to work, and then we use language more strong than polite. If we neglect what is our simple duty, can we wonder at the flies taking possession of our orchards like an unpaid mortgagee? Certainly not. I think myself that the fly trouble could be reduced to small dimensions if all growers would study one great point—the cardinal point; and that is, be clean in the orchard.

We know how to destroy the maggot, but we should like also some remedy to destroy or check in some way the fly itself. I have read of several remedies to combat or circumvent the flies, but none of them seemed to me to be of much use. One remedy was to cover the trees with mosquito net. Now, fancy covering 400 trees, each 16 feet high by 30 feet in circumference, with net, besides the trouble of getting the netting over the trees, tearing it, &c. The cost of the netting would about equal that of the crop.

The next remedy is to cover each orange with a piece of cloth. Just so. Kindly imagine one of us going out to tackle a tree with 2,000 oranges with a big bundle of rag and a ball of twine, twisting among the limbs, wriggling past the thorns! It would be lively and very painfully interesting, especially if we came across a hornet's nest in our travels. No doubt the flies would get a surprise, and wonder what had changed the skin of the orange, voting the whole thing a fraud. I don't think the rag dodge will do. It might work on a peach or plum tree, but is unworkable in an orange orchard. Then comes the great American remedy. All you require is two boards, each 2 inches square by half-an-inch thick. You then go and catch a fly, place it on one board, and squash it with the other. A truly sure remedy for that one fly. You would know that fly was dead for certain.

I have never come across a remedy yet that suggested itself to my mind as being of any practical use in killing flies until I reasoned one day that if tangletoe or tanglefoot placed on paper will catch house flies, why should not tangletoe placed on an orange catch fruit flies? The result was that I tangletoed several ripe oranges one evening, and placed them about the trees where the flies were most numerous, with splendid results. I set the traps in the evening, and next morning all my traps had fruit flies sticking to them. On one I had no less than fourteen flies for one night's work. The flies do not seem to notice the difference between a tangletoed orange and one not tangletoed. I have frequently seen them fly on to the traps in the daytime. The one great beauty of the trap is that when the fly goes to try that orange, it stops there. The remedy is simple; it is cheap; and what is more, it is sure to kill all that it catches, and I strongly recommend all my fellow fruit-growers who should be afflicted with the fly to try it; but remember one thing—Use only the ripest and yellowest orange for the traps. The fly won't go to a green orange if a yellow one can be got. The best oranges to use are those that have already been pierced by the fly. Not only will tangletoed oranges catch flies, but it will also catch moths. I have often caught moths both large and small. I fully believe that if every grower of fruit in this country were to simply do his duty, and see that every fallen fruit was picked up and destroyed, and by using every endeavour to kill the flies by some good remedy, such as tangletoe, the fly pest would be so reduced that their depredations would be very lightly felt. The fly question is a big one, and along with that other great pest—the scales—is going to cause us fruit-

growers a great deal of work and expense to keep in check. We can never totally exterminate the fly; it will always be with us, more or less, according to the way in which we welcome it. If we tamely stand by and do nothing, and give it every encouragement by our apathy, of course it will come with all its merry relations. What we want to do is to fight it in every way with the best weapons possible. If we do, I am sure we shall not fail to save the major portion of our fruit, and lessen their numbers immensely. One great drawback in the fight against the fly is the want of unanimity among the growers. While one man may be doing his best to destroy all vermin, his neighbour on the other side of the fence may be doing his best to raise as much vermin as he can, thus making the labour of the clean man null and void. Now, there ought to be something to prevent such a state of affairs, and the only way to do so would be the appointment of orchard inspectors, whose duty would be to compel every fruitgrower to keep his orchard free from fallen fruit, &c. It is very hard on the clean man to have his fruit injured through his neighbour's neglect; and if a man will not do what is only just to himself and his neighbours, there ought to be some law to compel him. I have now come to the end of my fly paper. I hope it attracted some of your attention, and I trust what little information about the use of tangletoe fly traps will prove useful to my fellow fruitgrowers. It is right, when we come to such Conferences as this, to give our penny-worth of information, and take away a pound's worth from others if we can—that is human nature. I expect there are a good many gentlemen present with fly experiences, and they will no doubt be getting on the wing and giving us some ideas about their troubles with the lively insect. Mr. Chairman and gentlemen, my fly has flown.

The two preceding papers were discussed at some length, a number of delegates giving their experience of the ravages of the fruit fly and of harmful and harmless birds.

A lively discussion also ensued on the paper on disease in sweet potatoes.

Mr. C. P. MAU (Mackay) said he had had a little experience in trying to eradicate the grub pest. Some twelve years ago, when he started canegrowing, he thought it would be also desirable to have a few potatoes, and he tried year after year to keep the grubs out of them. He planted the vines when the soil was hilled up, and just when they were struck out a little groove was made between the two rows on the top of the hill, and kainit applied. The cost of this fertiliser was about £4 per ton, and a ton would do for an acre of land, put round the root. He found, whether it was the cause of the death of the eggs or grubs, that he was able to grow the potatoes. Even if it did not kill them, it was an excellent manure.

Messrs. TARDENT, COOKSLEY, ATTHOW, MCLEAN, TRYON, and others contributed to a very interesting discussion on the subject.

OUR HORSE INDUSTRY.

[By W. R. ROBINSON, Royal Agricultural Society, Toowoomba.]

This most important industry to our State deserves, I think, more attention than it has received for years past; there is always an inclination for breeders to neglect the opportunity of securing a good sire when stock are low in the market; but in my opinion that is the very time breeders should secure the very best sires procurable. We have seen this sort of thing in all lines of stock in Queensland, but still many seem to run in the same old groove, and even now many are breeding from sires that should have been boiled down years ago.

While Germany, Russia, America, Austria, and Hungary are all paying attention to breeding remount and artillery horses of the highest quality, and the sister States are taking the matter up warmly, what are we in Queensland doing to encourage breeders or assist this important business? There is no climate where conditions are more favourable for the growth and production of good horses than in this State. The shipping conveniences at Pinkenba are as good as the best, as some of the largest horse ships afloat can berth there and load with very little delay. What is the best course to adopt to improve our own horses is the question?

First of all, I would suggest a tax of £10 per head per annum on all stallions from two years old upwards, and give the various divisional boards power to collect, they receiving one-third of the collections for their trouble. I am sure they would very soon collect the tax, and to some boards it would mean a nice little income The remaining two-thirds to be handed over to the Government as the nucleus of a fund for the purchase and importation of sires—such as Suffolks, Percherons, Arabs, English hackneys, and good-boned, thick-set thoroughbreds. These sires could stand at the various experimental farms, or be leased to reliable breeders.

Second: Pass an Act of Parliament prohibiting any race under 1 mile, with a minimum weight of 8 stone. This would in a very short time put an end to all the weedy sires one sees racing in 5 and 6 furlong races with a feather weight on them—a class of animal that is doing more to deteriorate our horses than anything I know of—mere gambling machines, and bad at that.

Third: The revenue derived from the totalisator tax might well be applied to the importation of stallions' fund. This, added to the tax on stallions, would soon amount to a good sum, and give the Government ample funds for a legitimate purpose.

Fourth: Careful inspection of all horses leaving the colony for export. Allow no rubbish or weedy sorts to leave our shores; owners would soon find out that it would pay them better to breed a few good ones instead of a lot of nondescripts.

Mares.—After making careful inquiries, I am convinced that we have some hundreds of first-class mares in Queensland suitable for breeding good Indian and South African horses, although, by reports from Southern authorities, I believe a great many of their best mares have been shipped away; if this is so, it is all the more reason that we should make a big bid for the industry.

Under orders from the Government of India, a commission met at Calcutta the Australian shippers, and heard their views on the horse supply; subsequently, the following letter, signed by all the leading shippers, was received:—

"We have the honour to place before you our views regarding the horse-breeding of Australia. In our opinion it is deteriorating, due to the cause of inferior stallions and exporting most of the best mares, breeders being tempted to sell on account of the high prices being given for Indian remounts. We think it would be beneficial to the industry if you were to advise the Australian Governments to put a heavy tax on stallions and limit the exportation of mares suitable for breeding. Also, the Government should supply a number of stallions for the use of breeders at a nominal fee for service."

India is a certain market for a big number of good horses every year, and the above letter from the shippers should be taken as a word of warning to us here; but, if some steps are not taken at once, the probabilities are that we may lose this important trade.

Artillery horses of an excellent stamp can be produced by using Suffolk or Percheron sires over breedy light mares, and a class that is always in demand at good prices. Height, 15-2; weight, about 1,100 to 1,200 lb.

Cavalry Horses.—Height, 15-1 or 15-2; must have quality, style, and action, short backs, good depth of back ribs, but not flat-sided; these can be produced by using good-boned, thick-set hackney or thoroughbred sires over our best-bodied mares.

Mr. J. McPHERSON (Rockhampton): I think Mr. Robinson deserves the thanks of Queensland horsebreeders for his valuable and interesting paper; but, if some of his suggestions were carried out, I do not think they would have their desired objects. This matter of horsebreeding has been taken up by a number of societies, and I know the Stockowners' Association at Rockhampton once invited its members to attend a meeting for the purpose of discussing whether anything could be done to improve the condition of the horsebreeding industry. The consensus of opinion was that a stallion tax would not have the desired effect. Nor do I think it would. Many people think if they buy a horse with a good pedigree and with a few performances, probably over short distances, that they have a very desirable animal. They bring him up to their district and breed from him. Those men look at that horse through their own spectacles, are impressed with the idea that he is a very valuable beast, and they would willingly pay a £10 tax on him. The tax, of course, might be very useful from a revenue point of view, but it would not have much effect on a man all of whose geese are swans. Owners of stallions have a tendency that way, and many of them would willingly pay £10 a year on the greatest rubbish

imaginable. So I do not think the proposed tax would attain the object aimed at. If something is not done to improve the industry and the class of horses which we have, our horses will deteriorate to such a degree that they will not be worth exporting. I am afraid we have not got the mares in the first instance. The good mares that we had in the State have been sold to go to India or South Africa Anything that is worth breeding from is exported. I have about 600 head of horses (I did not breed them myself), and I do not think there are half-a-dozen left that are worth putting to a good horse to breed from. Some months ago a buyer was advertising in the Rockhampton district that he would be glad to meet breeders. About 600 horses were brought in, but only 140 were selected, and those 140 were anything but a good lot. We want to induce people to go down South and buy good stallions with those three essentials—bone, substance, and conformation. Most of the horses that we now get are wanting in bone, and if your horse has not got good bone and good constitution you cannot expect to breed good stock. If you have not got good mares you are still further handicapped.

Mr. J. EDMINSTONE (Rockhampton): Mr. Robinson speaks of the Government importing horses for the use of the settlers, but I think the settlers ought to introduce them themselves. I think it is a matter that could be done by the associations, and I think the members combined could afford to buy a good horse for their own use. I do not believe in a £10 tax, but, if one is imposed, I think entires of the value of £50 or more should be exempted.

Messrs. TARDENT and SCHOLZ explained how the improvement of the breed of horses was managed in Switzerland, Germany, and Austria.

Mr. W. DEACON (Allora): I do not altogether agree with Mr. Robinson, although he is an expert on the subject he has written about. It is very strange now that, whenever a remedy is proposed for anything, it often as not takes the form of a tax. Taxes on trees and guns were both suggested this morning, and now we have here a tax on stallions. In the first instance, I do not agree with a stallion tax, because, if it had any effect, it would decrease the number of stallions and thereby lessen competition and the field of selection. In any event, I think plenty of people would keep inferior stallions, notwithstanding the tax. Breeders ought to be sufficiently acquainted with breeding matters to know that it is best to put their mares to good horses. In draught stock I think the great trouble has been the putting of too many mares to the one horse; and I have known 200 mares to be put to a single stallion in one season. I think, after all, the real cause of the deterioration in our horse stock is the price. The prices have gone down, and people have grown careless. I quite agree with what Mr. Robinson says about the horse of fifteen years ago—the low-set horse, generally bay in colour, with a little hair about the legs. I agree with the writer of the paper in his remarks about the maturity of horses, as I believe that a good old horse will do more than a young one. It may be that the grasses were more valuable then than they are now. However, if you give us the price we will produce what you want; but, so far, we have not had the price. As for the price obtained in India, we know that it goes into the dealers' pockets. One good suggestion has been made, and that is, with reference to the mule. The Agricultural Department has imported a good many things, and they might just as well import a donkey. Although the saddle horse in Queensland is probably not what it was, I think the draught horse of the present day is an infinite improvement on the draughts of twenty years ago, and particularly is this true of those that are seen on the Downs.

Mr. J. L. BOWMAN (Boonah): I would go further than Mr. Robinson, and not only tax stallions, but license them. A horse that was not fit to be taxed, I would not license. One gentleman suggested exempting from taxation any horse worth £50 or over, but in my opinion a horse that is not worth more than £50 should not be licensed.

Mr. ROBINSON having replied to the various criticisms on his paper, which was exceedingly well received,

The CHAIRMAN: I merely wish to make the remark that some few years ago Mr. J. T. Bell, the member for Dalby, introduced into the House a measure proposing a tax on stallions with the object, I think, that Mr. Robinson has in view. The tax did not pass; it was not approved. It was considered it might be oppressive to a number of persons who bred, cheaply, something which would do them. And perhaps a feeling of sympathy with carriers or persons, who they thought would be affected, prevented the members of the House from agreeing to the proposal. I notice also that it has been proposed that while a stallion of considerable value should not be taxed, with a view to encourage the importation of such animals, animals of a low value should be taxed. I can only say that in the House this might be looked upon as an endeavour to single out the poor man for taxation while it would allow the rich man to go free. With regard to the suggestion that the Government take upon itself the business of breeding stock and importing stallions, I do not think that the analogy with Europe is altogether a good one. We have not got millions of armed men, and the fact of the Government taking upon itself the breeding of stud stock for military purposes merely indicates that in a military nation, where conscription is necessary, it is also necessary for the Government to take those matters into its own hands. And I am not sure that the statement which was made that, in Europe, the Governments of many of the nations breed horses and import good horses from foreign countries is altogether in favour of our Government taking upon itself a similar duty. Because where do these European Governments import those good horses from? Largely from America and England. If, for instance, the best farm horses that can be got are Suffolks, and you have to send to England for them, that does not altogether show that the breeding of those animals should be taken out of the hands of private persons, because it is the private enterprise and skill of England and America that are producing some of the best horses of the day. The once despised mule, which has lately been so much thought of, comes from America; and the finest trotting horses are also the product of the judgment, care, and patience of breeders in that country. However beneficial such a tax as that suggested by Mr. Robinson may be, members of Parliament will require to be converted before we can obtain any substantial result from the opinions which have been expressed.

Mr. W. ATKINSON, of Danderoo, then read the following essay on—

THE POULTRY INDUSTRY.

To many farmers the title of this paper will seem absurd. "Just fancy calling the breeding of a few fowls an industry," they will say, and they will pass any article or paper on poultry as something of no importance. Our Government must surely take the same view of the matter, as I have never heard of the least action they have taken to push this industry along. Yet we find the Governments of other States and New Zealand are doing great things for this branch of a farmer's business. New South Wales, Victoria, and New Zealand have all established depôts where poultry are received by experts, dressed and sent abroad by them, and the demand is so great that it cannot be met. Several private firms in Queensland have exported poultry, and great credit is due to them for their efforts, but until the Government take this matter in hand Queensland will have to take a back seat; but just as surely as we occupy the position as the best beef-producing State in the Commonwealth, so surely can we beat all competitors in the poultry export trade if the business is undertaken by the farmers and the Government in a business-like way. Is the trade worth having? Well, just listen to this extract from the *Courier's* telegrams. It says this: "Wellington, 3rd March, 1902. The poultry industry in New Zealand was never in such a flourishing position as at present, and prospects for the future are very bright indeed. The Agricultural Department has been advised that there is a profitable market in South Africa for 40,000 head per month. A letter received states that, at the time of writing, frozen fowls were selling in Capetown at 16s. per pair, while preserved and fresh eggs fetched 3s. 6d. and 4s. 6d. per dozen respectively. Great activity prevails in all the Government poultry-dressing establishments, about 5,000 head per month being dealt with."

Since that date the trade in New Zealand has gone up to 22,000 per month, which is equal to the whole of the trade of the previous year. The New South Wales and Victorian Governments also do a very large business in exporting poultry, but, owing to the very short time I had to write this paper, I was unable to get their figures. Just to show the benefits our neighbours, the farmers on the Clarence River, are reaping from this industry, I will read another cutting, which says:—

"Now that the residents of the Clarence districts are agitating for railways and better water carriage, we get a rough estimation of the export trade with Sydney (says *Station, Farm, and Dairy*). From the figures given we find that the Clarence River steamers took to Sydney during the year 1901 19,784 cases of eggs, containing 712.224 dozen. This does not seem many when you say it quick, but it really means 8,500,000 eggs. Then there is the home consumption, which would bring the number up to 10,000,000—a good number to be produced yearly on one river. Allowing on an average that each fowl produces 100 eggs (eighty would be nearer the mark), there are in round numbers 100,000 fowls in the district. At an average of 9d. per dozen, the value of the Clarence River egg production is £33,000, and this with the export of poultry would mount up to about £37,000. On looking through further figures we find that 500,000 bushels of maize, valued at £62,000, were exported during the year 1901. The export of potatoes amounted to 4,000 tons, valued at £16,000, and pigs 7,120, valued at £14,230. So we see that the poultry industry beat the pig and potato productions, equalled more than half the great maize production, and from all accounts will be a large item in the export figures of 1902."

So you will see that while our farmers are sleeping on this matter others are making money. But before we can become exporters of good poultry the Government will have to appoint an expert to travel to the farmers to teach them how to breed the right class of bird fit for the export trade. This may seem a large order, but there is just as much skill required to breed poultry as to breed high-class stock of any kind, be it horses or cattle or sheep or pigs. The poultry sent by our farmers to the Brisbane market are a disgrace to us, and clearly show that we have not yet learnt how to breed table birds.

The following extract will show you the difference between high-class table birds and what we usually see sold as such:—

"EXPORT POULTRY SHOW.

"The first show in the colony of poultry suitable for export was held at the New Masonic Hall, Sydney, on the 8th and 9th May. About August last year Mr. Fegan, Minister for Agriculture, intimated his official approval of the show, and granted Government aid to the extent of £25. The entries were not as numerous as was anticipated, and came from well-known exhibitors of prize stock. Farmers and others who breed poultry for killing were not represented. It is satisfactory to know that the show will pay expenses, and that fanciers who import and breed pure stock had demonstrated their ability by judicious crossing to breed table poultry of the highest quality. The merit of the birds penned was a revelation even to men who had been among poultry all their lives. All the exhibits, with the exception of two or three precocious-looking cockerels, conformed to the six months' old limit. A couple of the prize-winners when plucked showed crooked breastbones, which, of course, was a serious defect. The champions of the show were a pair of plump pure Indian pullets, owned by Parsons and Wells. The dead weight of one was 5 lb. 1 oz., and she carried her breast meat to perfection. E. D. Westaway was second for the championship with a pair of well-conditioned Indian pullets, and third with a pair of cockerels of the same breed. A. Falconer showed some first-class silver Wyandottes, one of which, quite a young cockerel, dressed at 6 lb. 1 oz. Ben Pryor, of Greta, showed some prime specimens of Cook's new creation—spangled Orpingtons. They looked full age, and one dead cockerel weighed 5½ lb. Other birds that won admiration were J. E. Pemell's white Orpington cockerels, which averaged about 5¾ lb. each. The foregoing references are to purebred fowls. In the crossbreds the topnotchers were H. Cadell's Indian and buff Orpington cockerels, which for wealth of meat, youth, and size transcended anything in the show. I weighed one of these young giants carefully, and he tipped the beam at 7¾ lb. With white flesh and feet and barely a sign of spur, this, to my mind, is the ideal fowl for table use."

You will see by this that even the farmers of New South Wales did not compete with the professional breeders, but there is no reason why they should not be able to do so, and our farmers could do so if they were given a little instruction by an expert who should visit the farm and start them on right lines. Many of our farmers would improve their present flocks if they could get purebred stock birds at a reasonable rate; but, whenever they think about doing so, they are met with a quotation from

some breeder of, say, a guinea a head, and, in fact, our College advertise their cockerels at that price. Now, it should not be necessary for farmers to have to pay such a price, and if an expert were placed in charge of this industry he would be able to arrange with the high-class breeders all over the States for birds for farmers at, say, from 5s. to 10s. each, because purebred poultry-breeders breed hundreds of birds which are not fit for the show pens, and which to them are almost valueless; and these birds are just the ones suitable for farmers, because they will produce just as good table birds or just as good layers as would be got from a five-guinea stud bird.

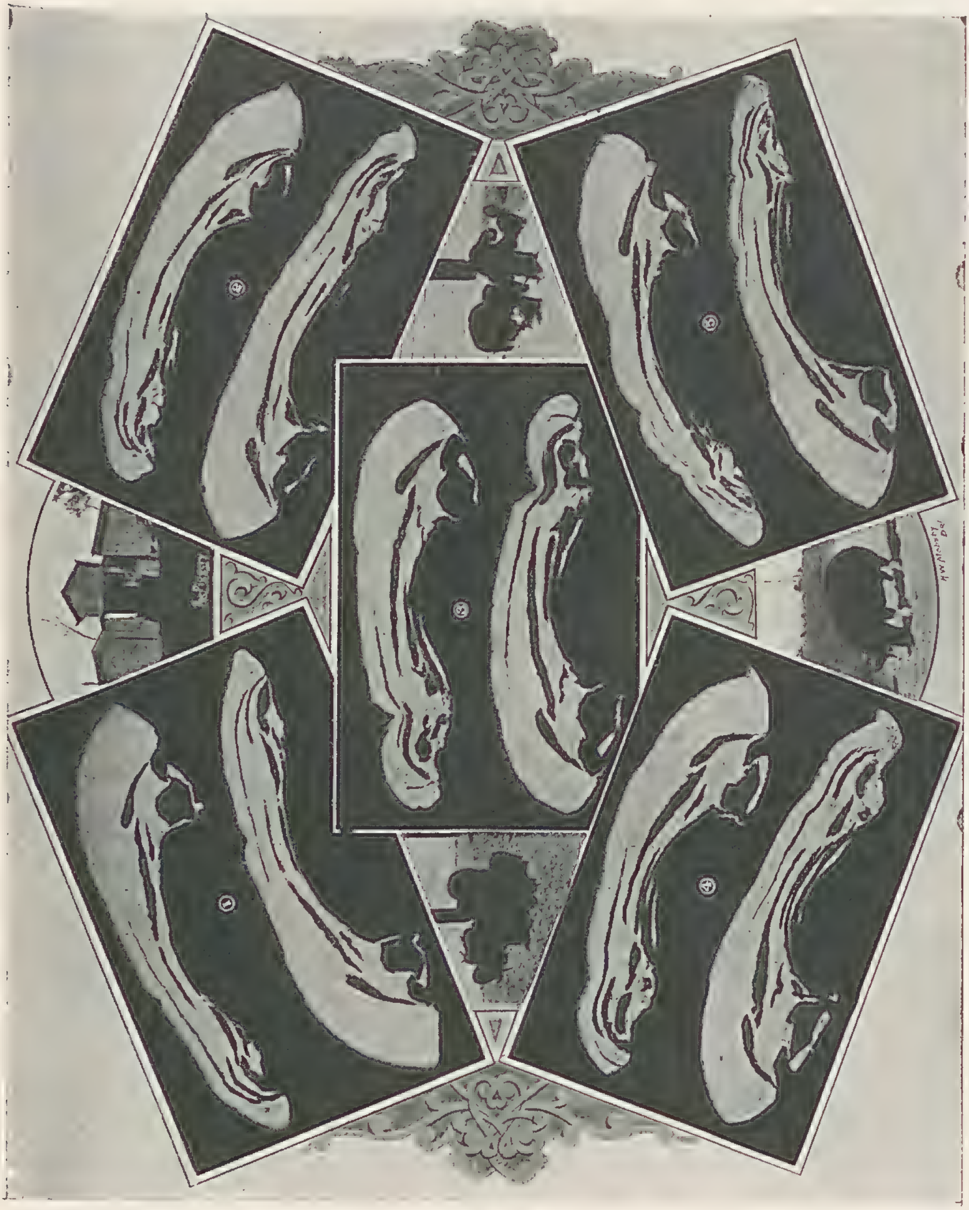
The great need at present is to introduce size into our present class of poultry for table purposes, and the best breeds to introduce into our poultry-yards to attain this object are Orpingtons, Wyandottes, or Langshans. These could be crossed with present stock or kept pure These are large-framed birds, quick growers, and are splendid for the table at from six to twelve months old. Once having got size into our table birds, they could be improved by introducing some of the game varieties, because the game varieties give a larger proportion of breast meat, besides being a better quality of flesh than any other breed; the very best variety of game for crossing purposes being the Indian. Now, no bird has yet been bred which can be claimed for it that it is the best table bird and also the best layer. So farmers will have to choose between table birds and layers which class of birds they will keep. The best class of birds for laying purposes are the Minorcas or the Leghorns. Hamburgs are also good layers, but their eggs are only small in size compared with the two former breeds. There are a large number of other breeds which are claimed by their respective breeders to be the best, but the breeds I have mentioned will suit the farmers best, and are the leading varieties in Australia to-day. If farmers will give this industry their attention, and go in for it in the same way as they are doing in the dairying industry, they will be surprised at the returns and the money to be made, and it will become second only to dairying. The labour is light, and the food also abounds on every farm even where a pig would starve. I hope this short paper will set every farmer thinking, because in these times of drought we must turn our attention to ready and sure money-making productions.

Mr. W. R. ROBINSON (Toowoomba): I have taken some trouble to go into this matter of exportation, and offered, a short while ago, that if ten farmers would send me ten decent fowls each I would send them to South Africa free of charge. I knew the price they would realise. After waiting a week I had a letter from a lady telling me she could let me have three hens. I think our Department could take a leaf out of the New South Wales Department's book in this respect. Mr. Atkinson's suggestion about crossing Indian game is a very good one, and any man, if he once eats Indian game, will never care about any other kind of fowl. It is like eating corn-fed pork as against slaughter-house pork. If farmers would only buy some Indian game and put them among their pullets they would breed good table birds.

Mr. J. E. DEAN (Maryborough): I have run an incubator for six years, and have often kept as many as 500 fowls at once, and, as far as I can see, there is money in this business if it is worked on the right lines. There are two essentials to success, however; and these are, that you should be able to command the right price, and also have the right kind of poultry. If we come to the killing kind, the kind which will bring the highest price and make the most weight with the smallest amount of food, we shall have to get the Indian game cock and the Dorking hen. In a short time you will get a bird weighing about 6 lb. with a very fine white flesh. As for laying breeds, you cannot beat the Leghorn. The Minorca is not a bad fowl, but it will not lay the number of eggs the Leghorn does. The Hamburg lays well, but its egg is rather small. The main thing in poultry is the feed, and if you have to pay a high price for that the profits in the industry begin to decrease very materially. Wheat, for instance, is rather too high at present for feeding fowls with. If people are going to keep fowls they will have to make provision to supply them with plenty of grit and bone. I imported a machine to cut green bone. These green bones supply everything that is in the egg, including the shell. I hope to see the industry progress, and Mr. Atkinson deserves to be thanked for the very able manner in which he has brought the subject forward.

Mr. W. ATKINSON (Danderoo): Farmers who grow wheat and other crops are apt to look rather contemptuously at the poultry industry, but it is a thing

Plate I.



Experiments in Pig-Feeding.—Queensland Agricultural College

that should receive as much attention as the dairy, and with care and energy it will often return as much to the farmer as the dairy. Of course, it is not going to return everything in a fortnight. Mr. Robinson suggested crossing the Indian game on our present poultry; but the objection to that is, that the poultry we have now are too small and too inbred, besides being nondescript. If you put Indian game on that class of bird, you would find that the result would not be so good as if you started to breed the birds to size first. If you can put the Indian game on to the old type of Cochin Chinas, you will do some good; but I am afraid there are not many of the Cochin Chinas about, as the breed has not been much in fashion during the last few years. The only rooster you should have on your place is the one in the breeding pens. Never run a male bird with your laying hens. The Indian game and Dorking cross has been recommended, but by crossing the Indian game on the Orpington you will get a bigger bird, and weight is very important.

The next paper was by Mr. A. H. McShane, of Toowoomba, on—

DAIRYING IN QUEENSLAND.

[By A. H. McShane, Drayton and Toowoomba Agricultural and Horticultural Society.]

To attempt to deal with the dairying industry in all its phases and with its many side issues, exhaustively, would occupy too much of our time. I therefore propose to give briefly a review of its early history and gradual developments. Then we shall arrive at its present stage; and some of the difficulties and evils surrounding the industry will be pointed out, and suggestions made for their remedy.

Dairying has, of course, been carried on in Queensland since the days of the early pioneers; but, as it can hardly be classed as an industry till factories—both butter and cheese—came into existence, we will start our review with the year 1891, when the first statistics were published. At this time we find that over 900 tons of butter and 80 tons of cheese were produced, nearly 2,000 people being employed in the business. Of course, the greater portion of this manufacture was done on the farms, there being only one or two small factories in existence then. Steady progress was made during the next few years, particularly in the direction of establishing factories and creaming stations in closely settled districts. The higher value placed upon the milk production by the establishment of these skimming stations in conjunction with factories became so apparent and convincing that numbers of farmers, who had hitherto confined themselves entirely to agriculture, entered into the dairying business with such energy that we find, in 1900, fifty-three butter and cheese factories and 146 creameries in existence. During this year, 3,875 tons of butter and 1,984,705 lb. of cheese were made—a wonderful increase in nine years. The value of these products was roughly £300,000, so that we find the industry (at this time still in its infancy) rapidly becoming one of the most important in Queensland. Since 1898, a marvellous development has taken place. There has been what might be termed a "boom" in connec ion with the industry. Districts that hitherto had never attempted dairying were forced into the business by the profitable returns obtained by the milk-producers, and to-day we find dairying carried on all over Southern Queensland and as far north as Mackay. The expansion in production naturally led us to seek outside markets, the demand in Queensland having been overtaken. England has always been regarded as the market for surplus Australian butter, and in 1897 our first shipment was made. During that year 188 tons of butter were exported, valued at £16,800. In 1898 the export more than doubled that of the previous year, the value being £37,500, which increased to £49,000 in 1899 The shippers had all along realised the disadvantages of not having a regular and frequent service for the conveyance of their produce. The British-India Steam Navigation Company's steamers only sailed monthly, which necessitated the butter being stored here sometimes as long as four weeks. These vessels also took much longer to reach England than the Peninsular and Oriental and Orient Company's boats by which our Southern competitors were shipping. The Government were approached with a view to persuading the P. and O. and Orient boats to call here, and, failing that, to establish connection with these vessels by means of a fortnightly service from Queensland. The Government realised the importance of quick transit, and, as the P. and O. and Orient Companies could not be persuaded to come to Brisbane, gave a guarantee to the Adelaide Shipping Company to cover the freight between Brisbane and Sydney for the shipping season (190C

and 1901). Unfortunately, the season was all against the producers, but nevertheless 620 tons of butter were shipped, valued at £51,700. The Government were a good deal out of pocket directly, although indirectly nothing was lost, as the producers were paid better values owing to the storage and interest charges being much reduced, which enabled the manufacturer to pay higher prices. Though the statistics are not yet to hand for 1901, a marvellous increase in production took place. The failure of the pastoral industry through the severe drought and the stagnation in some of the mining centres, together with the unrest in connection with the sugar business, have brought the value of the dairying industry into more prominent notice.

We have had lately a series of articles, excellently written, appearing in the *Courier* and *Queenslander*, dealing with the industry in the Southern States as well as in Queensland, and these have been read with keen interest. Many valuable suggestions for the improvement of the industry were made, some of which I hope to elaborate upon later. The advent of federation, and consequent abolition of inter-state duties, places our sister States on an equality with us in regard to our far Northern trade. Other competitors are striving for a grip of the English market, notably Denmark and Russia, where the Governments are encouraging the industry in every possible way. With these facts before us, we must therefore consider whether the industry is likely to be affected by them. Are the Continental dairying countries to secure the English trade? and is our Northern trade to fall into the hands of southern producers? Most assuredly these things will happen unless an alteration is made from our present-day method of dairying. The quality of our product is deteriorating because the care and attention are not being given to the production of the raw material which are so necessary if we are to face the competition of the world. While we are idle, both New South Wales and Victoria are moving vigorously to ascertain the causes of deterioration and their remedies. Science is brought largely into play in connection with the industry, and they are gradually, but surely, overcoming their difficulties. Are we not to profit by their work and experience? I sincerely hope so, and trust that our dairymen will realise the dangers in front and set to work vigorously to remove them.

CATTLE.—One of the first things to be improved is the quality of the milking herds. The average cow now being milked in Queensland is certainly not of a high standard. It costs no more to feed a good cow than to feed a bad one, and the dairyman will soon find that the extra original cost is more than repaid by the return he obtains from the good cow. While I would not presume to advise the breed of cattle to keep—the question at present being a very vexed one—I would point out for your consideration a few points in favour of the Shorthorn for Queensland. In the first place, the Shorthorn is more of a "general purpose cow," as our American friends would say, and, when found not profitable as a milker, would be worth much more as a fat or as a store for fattening on account of size; and, as this State is likely to have so many graziers following the occupation of fattening, this is an important point. No doubt some very fine milkers are bred from common cows crossed with the Jersey or Ayrshire bull, but the trouble is to know when to stop crossing. In my mind and experience they deteriorate after the first-cross. I would here point out that in order to dairy successfully, in addition to good cows, a good bull is absolutely essential. Having determined upon a particular breed, it is advisable to make certain that he came from a good milking strain, and is a true type of his parents for at least three generations. Where a large dairy herd is kept, it is a good idea to keep two or even three bulls of different strains and mate them with cows to suit. Having obtained a fair herd, the dairyman should always seek to improve; and to do this it is necessary to keep a record of each cow's return of commercial butter, and to adopt the standard to work by, any cows not reaching that standard being culled out. Year by year the standard can be raised till a very high point is reached, and the business has become highly profitable. While I would not wish to cast any reflection upon purebred Ayrshires, Jerseys, and other Island breeds—the trouble at present being to get pure types—the purity of breed would have to be well ascertained to ensure best results. And, again, to buy a herd of purebreds is beyond the reach of the average dairyman. Once a high standard of thoroughbred is obtained it is not, in my mind, advisable to cross.

FEED.—The feed of the cattle can also be much improved. A great deal of dependence is at present placed upon the natural grasses, and when these fail, as in the present drought, the dairyman is left somewhat in a hole. Artificial grasses such as *Paspalum dilatatum*, lucerne, &c., should be cultivated together with maize, barley, rye, and wheat for green feed. Rye makes an excellent early winter feed, and, as it

grows much quicker than other cereals, is highly recommended. If these are not required for feed at the moment, ensilage can always be made, and thereby provision obtained against the proverbial "rainy day."

The chief cause of the deterioration in our butter is, however, mainly the result of the introduction of the "home separator." Until the year 1898, the work of separating the cream from the milk had been mainly done at large skimming stations. A station was established in a closely settled district, and the milk from the surrounding farms separated daily. By this means a regular, even quality of cream was obtained. This cream was despatched daily to the factory, and the manufacturer, by having the cream to hand fresh, was able to produce a quality of butter which was not excelled anywhere. Our product was received with favour on the London market, and, if this high quality could have been maintained, the success of the export business was assured. Unfortunately, a new system sprang up—to wit, the establishment of separators on the farms—which, altering as it did the quality of cream—firstly, by the different degrees of density at which the separation took place; secondly, by the length of time the cream was held before despatching to the factory; and, thirdly, by the conditions under which the milk was separated—has given those manufacturers who have the welfare of the industry at heart many an anxious moment. Under the old conditions, 400 to 500 lb. of cream of an even degree of density would be despatched daily from a skimming station. To-day, this quantity of cream would probably be made up of from nine to ten suppliers, each man's cream being of a different degree of density, and the age of the cream varying from one to seven or even ten days. The establishment of numerous factories has rendered competition so keen that any cream is accepted, and full value is paid The factories which have attempted to stem the tide of disaster have found their suppliers deserting them because they would not pay full value for inferior cream, and have had, unfortunately, to fall in with the majority, and treat all conditions of cream as of the same value.

In very few cases are proper dairies constructed on the farms in which to place the cream awaiting transit, so that it has to lie amidst the most unsanitary conditions, absorbing bacteria of the most harmful description. Realising that the home separator has come to stay, I only mention these points to show in what direction an improvement is required.

Our experience, however, is only that of the sister States, and it is to be hoped that we can take a lesson from their book and profit by their knowledge. In those States we find Dairy Acts have been introduced, working upon somewhat different lines, but with the one object in view—viz., the improvement in the products. In Queensland our Dairy Act only covers the largest towns and affects principally those dairymen who supply milk for home consumption. What we want here is an Act compelling, first of all, the registration of every person who disposes of dairy produce in any shape or form. An improvement in the milking sheds and yards, and separator house, and the condition of the pig yards, together with the erection of a suitable house to hold the produce awaiting transit to market, should be insisted upon.

Absolute cleanliness is decidedly essential, and the milking of diseased cattle, after instructions have been given to destroy the same, should be deemed a criminal act. Dairymen should not be allowed to keep cream longer than two days before despatching it to a factory.

These are a few of the most important points which require immediate attention, and, if an Act covering these were to be wisely and strictly administered, the ultimate success of the industry would be well assured. Under such an Act, inspectors for various districts would be appointed, whose duties would be to inspect all dairies and cattle, and to rigidly enforce its provisions. They would, of course, require some veterinary knowledge in order to detect diseased cattle.

An excellent way of conveying information to the dairymen is by means of lectures illustrated by lantern views showing the various changes which take place in the raw material under different conditions. Lectures might also be given in the State schools, and the rising generation taught the right method of starting the industry.

I sincerely trust the Government will introduce an Act during the coming session dealing with this vast industry, and that in framing the Act they will carefully gather information from the producers and manufacturers. They are able to give the information necessary for the successful framing of such an Act, as they will realise the difficulties to be contended with and suggest the best means of remedying them.

Since the above paper was written and sent to the Department of Agriculture, the returns for the export of dairy produce for the year 1901 are complete and

published, and in accordance with my anticipation a decided increase on all previous years has taken place. The figures are:—

Pounds of butter, 2,085,998, valued at	£86,171
Pounds of cheese, 246,576, valued at	6,015
Pounds of bacon, 421,767, valued at	12,035
While the value of hams exported was	19,364
Making a total of	£123,585

As bacon and hams are so closely associated with the dairying industry, I merely mention them to show the total value of export that may be reasonably attributed to this very important industry.

Mr. HAY (North Pine): The paper that has been read is of very great interest to the dairying section of the community, and it is one that deserves the earnest consideration of that section. I do not stand up to differ from Mr. McShane, except where he states that the use of the home separator has not been a success. We that have used it have found that it has been a great success. It has been a great convenience to us, and our pigs and calves have benefited through it. We find, moreover, that we make more money than we did when we had our milk separated at the creamery. I believe, however, that it will be necessary in the future for inspectors to go round to see that there are no diseased cows milked, and that the dairies are kept clean. Round the towns the dairies are inspected, but, outside, I am convinced there are a lot of people who are not too particular. If there were a system of thorough cleanliness, and the cream sent regularly to the factory, I do not see any reason why as good butter should not be made from home-separated cream as from cream separated at a creamery or factory. The Shorthorn, taken as a whole, is about the best cow that we have so far tried. I have been dairying for this last thirty-five years, and have tried the Jerseys, but they have not been a success with me. They gave rich milk, but not enough of it, and in the system of farming I follow I depend upon the natural grasses. This system does not suit the Jersey. We had a breed of Shorthorns of a milking strain, and have some of them yet. Although I have had the Ayrshire in between, you can trace that breed of Shorthorns all through, and they have proved better than the Jersey or the Ayrshire. For those people who depend upon the natural grasses, you cannot beat the Shorthorn. If you artificially feed your cattle, of course the Jersey will do well.

Mr. D. WEBSTER (Gympie): In my opinion, a good deal depends upon the district in which you are dairying as to which is the best breed of cattle. Where I am, the Shorthorn will not do, as our country will not carry large cattle. We have tried the Jerseys and the Ayrshires, and the cross between the two seems to suit our country best. You get the milk from the Ayrshire, and the butter from the Jersey. I was rather astonished to hear a few of the statements in Mr. McShane's paper. Where I am, they would not take cream from seven to ten days old. With respect to the hand separator, I used to take my milk and cream to the factory; but now I make my own butter, and it is equal to if not better than the butter made by the Gympie Butter Factory. It is the fact that so many different creams are mixed that causes deterioration in butter. From two to three days is the longest we can keep our cream.

Mr. C. JONES (Blackall Range): In our district we find the Jersey or the Ayrshire makes the best dairy cow. We have a lot of scrub and forest ridge country, and there is generally no lack of rain. In the wet weather the cattle go on to the ridges. In 1894 we first started the *Paspalum dilatatum*, and that has now spread over the whole district, going up as far as Woodford.

Mr. J. L. BOWMAN (Boonah): The best cross we have found for dairy cattle is a Jersey bull on a Shorthorn cow. These half Jerseys stand the pinch of dry weather far better than the pure Shorthorns or Jerseys, and altogether as a general purpose cow you cannot beat the halfbred Jersey.

Mr. A. SMITH (Woongarra): An important point is the housing of dairy cattle. I have tried both housing and letting them run out, and my experience

is that the cattle that have been housed during the cold weather have doubly repaid the care bestowed on them. Some of you may consider that housing is too expensive, but I do not think it is so. You can construct a byre that will cost very little, and I am confident that the extra return you will get all through the winter will more than compensate you for the initial outlay. More than that: Cattle which have been properly housed during the winter will respond, by an increased flow of milk, far more quickly on the first approach of summer than they otherwise would. As for the suggested legislation, I think the less Acts of Parliament the industry has to carry, the better for it. The main issue of success lies entirely in the hands of the dairymen and butter manufacturers.

Mr. J. E. Dean (Maryborough): We must not forget that the future of the dairying industry in Queensland depends largely upon an export trade in butter. The Danes look to their breeds of cattle for securing the best flavour in their butter, and I think we shall have to look to the Jersey to give a flavour to our butter. By introducing and using the Jersey, I think this effect will be achieved. Our future depends upon the market of the future, and that market depends upon our product now. If you send to your factory cream that has been tainted, the resultant butter will be affected, and the price that it will fetch will be low when it has to compete against other butters in the London market. The tests made at factories have been referred to, and this is always a source of trouble between suppliers and manufacturers. I find from practical results that butter loses from 7 to 10 per cent. on account of the second working.

Mr. Thos. Hamlyn (Crow's Nest): In hilly country a big type of cattle is not desirable for dairying purposes, especially if it is country where food is not too plentiful. For a dairyman who depends wholly upon his dairy, I do not think there is any cow which will beat the Jersey. If you want to mix things a bit and raise beef as well, you will have to cross the Jersey with the Shorthorn. I have tried all kinds of food, and amongst them Cape barley. Cape barley is not too good as a milk-producer, and malting barley is an improvement. Malting barley, however, does not yield a large enough crop of fodder. Skinless barley answers very well, and cattle like it. Cornstalks, again, make a good fodder, but the best food I have found is lucerne. Mr. McShane condemned the use of home separators, but these appliances have been a boon to the farmers of the Darling Downs. When we took our milk to the creameries we had to cart it 5 or 6 miles, and a man's time was too much taken up altogether. Taking milk to a creamery involves too much waste of time.

Mr. John Reid (Brisbane): I have been listening with very great interest to the discussion, as I also listened with pleasure to Mr. McShane's paper. Although, Mr. Chairman, you have pointed out that our time is rather limited, I think the rather lengthy discussion that has taken place is justified, because I think this is one of the most important questions on your syllabus. Not only because the dairying industry has rendered important service to the farmers of Queensland, but because, in that industry, is incorporated the policy of your Government with respect to land settlement. If you separate the dairy interests from the policy of land settlement which the Government has so fully pushed forward during the past few years, your efforts in that latter direction will fail considerably. With the large number of farmers going upon our lands, it is very apparent that the demands for the rougher classes of produce will be easily filled, and the farmers will then have to turn to such problems as the disposal of the produce of their farms and in the most convenient form. It will be useless for our farmers to grow vast quantities of lucerne hay unless they can find a market for it. In an ordinary good season, with a large increase in the number of farmers in our State, it is easy to see that, without some kindred industry to assimilate it, lucerne hay would hardly be marketable. The problem of the disposal of our produce is, therefore, before us, and we can accordingly discuss no more fitting question than this of dairying. The very land settlement is associated with the industry, and with it our railway system.

Unless the land is settled, our railways will never reach a point when even a little dividend will be payable. There has been a good deal said about the home separator, and I recognise, as one connected with the business, that the home separator *does* offer advantages to the farmer. We have often improved the quality of the cream by that means. Again, there are the evils attendant on the cream being kept on the farm for too great a length of time. One delegate spoke of the necessity for factories rejecting such cream. The same difficulty has arisen in the Southern States and in America, and it has been found that it is almost impossible to set up a standard by which cream may be judged. If some of our experts could put in our hands some means of determining a standard by which cream could be gauged, they would bestow a great benefit on the industry. But it is now almost impossible to fix a standard for the rejection or acceptance of cream. While we have, in Australia, made wonderful progress in this industry, other countries have come along in a marvellous way. Some have referred to Denmark, but the most extraordinary development of this business has taken place in a most unlikely country, and that is—Siberia. It is here that Siberian competition has an important bearing upon Queensland. The Russian farm labourer is content with a small wage; and it is a matter of considerable importance to us when we find a large number of people, well looked after by the Russian Government and every facility placed in their way, entering into competition with us. I have received a letter from an agent in Glasgow, and he referred to the fact that the quality of the Siberian butter imported into the United Kingdom has greatly improved—that the Danish people have been buying up the Russian butter and putting it on the English market under their own brands. So it is imperative that no stone should be left unturned to prevent damage to Queensland in this important industry.

Mr. A. McSHANE (Toowoomba): When I took up this subject I knew there would be a lot of discussion on it, but I thought my views would have met with a little more opposition. The main objections, of course, have arisen over my remarks on the home separator. A good many of the people who have spoken referred to Denmark as an ideal dairying country, but most of those people were perhaps not aware that there is not a single home separator in Denmark. Their use there is prohibited by Act of Parliament. I do not say that the home separator will not make good butter, and it will make good butter for home consumption. But let those gentlemen who make their own butter put it on the London market, and see how it will fare there.

The CHAIRMAN: The very great importance of the dairying industry to Queensland has been fully admitted by the Government. The Government long ago began with the travelling dairies. Since that time a Co-operative Act has been passed under which assistance has been given to all those who desire to establish factories, and as late as last session a modification was made in the Lands Purchase Act whereby land could be obtained under it for purely dairying purposes. I can assure you that there is no subject upon which the Government is more unanimous than upon the importance of the agricultural industry and the importance of that great branch connected with dairying. A gentleman has suggested that the Government supply bulls for the use of dairy farmers, but to attempt to do that would be undertaking a rather large contract, especially when we take the size of Queensland and the number of dairy farmers into consideration. Some years ago Mr. Chataway tried this experiment when the position of the public Treasury was much more cheerful than it is now. A very good Ayrshire bull was stationed at the Westbrook State Farm, and a charge of 5s. a cow was made for its services. It was there four years, and there were not more than ten or a dozen cows sent to it. I can assure you that in this matter of the Department placing bulls at the disposal of farmers considerable difficulty has to be encountered. Members of associations quarrel as to what kind of bull they should have sent to them. One farmer says the bull must be an Ayrshire, and that he would not have a Jersey near his place; another wants a Holstein. Then there is the question as to who

is to have the first service. With respect to the *Paspalum dilatatum*, we all know that it is acknowledged to be a superior grass. It has existed at the Agricultural College for a number of years, and Mr. Mahon is distributing roots of it on very reasonable terms—that is, a small sum is charged to defray the cost of packing. In these matters, at any rate, I do not think the Department has been neglectful of its duties.

THE NECESSITY FOR A STATISTICAL BRANCH IN CONNECTION WITH THE DEPARTMENT OF AGRICULTURE.

Mr. W. Deacon (Allora): There is no body of men upon which such a quantity of good and bad advice is thrown away as farmers, but what is really wanted is knowledge. Knowledge is power. When we have got our crops grown and go into the market with them, as a rule we know nothing of their value. We are in the hands of rings and speculators. These men use their knowledge to buy crops that they know they can make a good profit on when it comes to reselling or using them. The present good price for wheat has been put down to the auction sales inducing keener competition and to the *Courier* newspaper, but, after all, I fancy the superior knowledge of the millers was at the bottom of it. I am informed one miller bought enough wheat for two years. In one State, it is said that the Government over-estimated their crop by 4,000,000 bushels, and we know that many farmers, in the early part of the season, sold their wheat at 2s. 4d. a bushel. I know myself one farmer who sold his 2,000 bags at 2s. 4d. per bushel. That is a loss of £800 to that farmer, and it has all gone into one man's or firm's pocket. Prices do not vary in America like they do here. They may advance, but not to the extent that they do in Queensland. When maize-growers go into the market, they do not know whether they are going to get 2s. or 4s. a bushel. We sometimes see maize at 2s.; then it is up in a few days to 3s. or 4s.; but it would not vary like that if there were definite knowledge of what crops there were in the country. There is one industry which the country does know something about, and that is sugar, but it is an industry that is organised on a much better scale than anything else in the country. With respect to such articles as hay, perhaps we would not be able to do much in the way of getting reliable estimates of probable quantities available, but we ought to be able to do so with wheat and maize. In England you can get information every month as to the state of the crops, and we know that in Europe they can tell almost to a few thousand tons what the sugar crop is going to be. I believe the Agricultural Department did have this matter under consideration some years ago, but I still think information could be gathered and published as to how the wheat crop was coming in, what maize was in the country, what maize was wanted, and so on; so that we would not have a farmer selling his grain one week in the market for 2s., and his neighbour getting 4s. the week after.

Mr. P. McLean (Agricultural Department): Some seven or eight years ago the Agricultural Department was quite alive to the necessity of being able to supply the kind of information which I think Mr. Deacon is aiming at. What we tried to find out was, not the quantity of the crop that had been grown, but the probable quantity of the crop that would be grown. The idea was to supply information that would regulate the market. At that time, for instance, a large quantity of maize was grown in the Bundaberg district, but the lack of definite information concerning it had a disquieting effect on the markets supplied by the Darling Downs and Moreton districts. The administrators of the various local divisions are generally pretty well acquainted with the condition and prospects of their respective divisions; and I naturally thought that, with their co-operation, the Department would be able to obtain and publish the desired information. Circulars were accordingly sent out to all the local authorities asking their assistance. Some of them point-blank refused; others ignored the application; and one or two said, in a half-hearted manner, that they would be willing to do what they could. We saw the

necessity years ago of the information that Mr. Deacon speaks of, but unfortunately the essential co-operation of the clerks of the divisional boards was denied us. We have also applied to the owners of the threshing plants, as Mr. Lamb can testify, for information relative to the probable yield of wheat; but they could not supply particulars until they had finished their threshing. When they had finished, I admit, they were quite willing to supply information, but then it would be too late to be of much service. If we had applied to the Home Secretary's Department we would have been told that the police collected these figures. So they do, but the information is not available until twelve months after it is wanted. The Department is fully seized of the importance of what Mr. Deacon is driving at, and it had gone so far as to have the country mapped out into districts. It communicated with a number of leading men in each district to see if they would act as correspondents, but the adoption of such a system as that would probably involve expense; and, as the Department in these times has not too much spare money, we have been unable to do anything definite so far in that direction.

Mr. C. P. MAU (Mackay): Co-operation is a subject that I am very much in favour of, and I can assure you that with it the farmers of this State can accomplish much. In the Pioneer River district the Association calls for tenders every couple of months for the supply of certain articles for the use of the members, and those members thereby secure a large proportion of their goods at a big percentage under what they would otherwise have to pay for them.

Mr. THOMAS HAMLYN (Crow's Nest): I am a member of a divisional board, and remember the correspondence to which Mr. McLean refers. We naturally thought then, however, that it was an endeavour to relieve the police of work they had been doing all along. If the boards had taken on the work, in many cases they would probably have had to employ a man to attend to it. I would suggest to the Department that it send out circulars to individuals and obtain the information that way.

Mr. W. MISCAMBLE (Roma): I certainly think that farmers and other producers very often lose a great amount of money through ignorance as to the value and probable future value of their crops. We are trying to grow wheat up our way. Everybody was out of his calculations with respect to the total quantity of wheat grown in Australia during the past season, and most of the people up our way thought they were doing well, when they compared it with the rates in other places, when they got 2s. 5d. per bushel for their wheat. Instead of the wheat crop turning out to be a 48,000,000 bushel one, however, it was flashed out about the middle of March that shippers had shipped away 11,000,000 bushels of wheat, reckoning on the not realised 48,000,000 bushels. The result has been that wheat has gone up to 4s. 4d., but innumerable farmers have in no way participated in that improvement in price. This has been a great loss to a number of growers, and anything that can be done to help the Department in gathering information as to probable yields should be cheerfully rendered, as the farmers themselves are the ones who will most benefit by having the knowledge in question published.

Mr. W. DEACON (Allora): Every time the Department has sent to me for information of this nature I have always endeavoured to supply it, and I remember that the last time I furnished it with an estimate time afterwards proved to be very nearly correct.

Mr. J. E. DEAN, of Woodlands, Maryborough, then read the following paper on—

IMMIGRATION.

[By J. EDGAR DEAN, Woodlands, Maryborough.]

It is not my intention to occupy the time of this Conference with an unnecessary description of the system under which immigration was conducted in the past. I will come to the point by saying that to a large extent it failed in its object—*i.e.*, to provide a suitable class of labour for agricultural pursuits.

First, because the majority of those who were brought here were not farm labourers, amongst them being men from every branch of trade in the United Kingdom, many of them having as much practical knowledge of farming as a South Sea Islander has of Greek; also many of those who came stayed in the towns or found work on the railway lines and other places. Others again, unable to find suitable employment, migrated to the southern States, although the taxpayers of Queensland had paid from £9 to £13 each for the passages of these men. The effect has been that whilst men have been hustling each other in the town for a few days' work to enable them to live, production has been checked because farmers were unable to get the necessary labour. To those who think that agriculture, dairying, &c., are not of much importance, or worthy of special consideration, I would point out that there is still plenty of gold in the mines, plenty of coals in the bowels of the earth, plenty of timber in the forests, but without the farmer these things fail to give prosperity, so we must admit there is some truth in the old saying, "The farmer pays for all." Then is it not wise to give him the necessary labour to work for the good of all? If the past has not been too good for the farmer, is there any prospect of the future being better? There loom ahead in the dim future an income tax, a land tax, a minimum wage, and a statutory eight hours. The first we need not fear. Our surplus income is not likely to be large enough to tax —if it is we will willingly pay it. The second will cause us to pay more money away directly and indirectly, for the tradespeople will put the amount of their land tax upon the goods they sell. The third and fourth will be a stronger inducement for the country labourer to come into town and pass a miserable existence on a few days' work per week, although his wife and children may not be so well fed and clothed as if in the country, with its fresh air and freedom, with plenty of milk, fresh eggs, vegetables and fruit, and everything conducive to growing up to a strong, healthy, independent manhood or womanhood, free from the physical and moral taints which, alas, are too common in city life. Our future prosperity depends upon the value of our production and exports. If these are attended to the towns will follow as a natural consequence, though large cities are a curse, being hotbeds of sin and iniquity. There is plenty of work to do if reliable labour could be found to do it. In my district (the Wide Bay) there are plenty of openings for the use of capital which would be a help to the employer and the employee and to the country in general, but those who would like to embark in these undertakings are afraid to do so. They say we cannot rely upon the labour, for at a critical time we may be left in the lurch, and suffer heavy loss if not ruin, and owing to this enterprise is strangled, and the people of the State are the losers. I am not alluding to black labour. I will quote from an article which appeared in the *Maryborough Chronicle* of the 28th May, which was taken from the Melbourne *Argus*. Mr. Mackenzie, the president of the Butter Manufacturers' Association, having just returned from London, has much to say on the trade. Mr. Mackenzie believes that if Australia is to improve her footing in the old world, and to make it permanent, our butter-makers will have to address themselves seriously to the subject of winter production. After giving good reasons why this should be done, the article goes on:—Our dairy people say: "Winter production means more labour—labour in growing fodder, labour in feeding the herds, labour all round. Our families, when we have families, cannot stand the strain of such work, and as to labour, we cannot even obtain labour for summer production. We cannot pay the rates of the Wages Board even in summer. France does not pay those wages, nor Denmark, nor Holland, and therefore winter competition is impossible. We are dropping more and more to the position that we have to even limit our summer production to the herds which we can manage without hired help." After expressing what the dairy people say, the *Argus* continues: —"This is substantially the position, and how it is to be altered so as to make winter production a possibility is not easy to foretell. As Mr. Mackenzie says, the problem has to be grappled with, and the best minds of the industry and the best minds of those who wish the development of the State need to be

steadily directed to it. It certainly is an anomaly that on the one hand we should have a piteous cry of distress from the unemployed every year in the winter, and that on the other hand we should be told that the impossibility of obtaining labour should make a winter industry impossible. It is a curious problem that has to be worked out in Victoria as between the conflicting claims of the Trades Hall and the country industries." I am sure that not only in Victoria but in Queensland this problem has to be solved. I may claim to know something of the difficulties which beset us. I do not claim to be a very large dairyman, though I employ three or four persons all the year through. With one good man I can manage with lads of fourteen years and upwards for the lighter work, as I have fed all the milking cows twice daily for the last six years. I know what class of labour the dairymen and farmers require, and often during the past seventeen years, when I had got a lad well used to the work, and had inculcated habits of cleanliness and care in the treatment of milk and cream, &c., I have been met with something like the following: "Father says I am getting strong now, and he wants me to learn the blacksmithing." If not that it is to learn something else, and I have to go over the whole process with someone else. Odd ones, of course, have stayed for years. In speaking of my own case I am only describing the experience of others. If it is necessary to teach boys other trades, is it not also necessary to teach them farming and dairying, and why should we not have a class of men who can say, "I have been trained to do farm work or dairying work"? I may say this kind of man never need be out of work. I have pointed out the difficulties of the present and hinted at those of the future, and I think it is quite time we try and secure for the good of the State as a whole the class of labour we want. I would not recommend the Government to bring out any more men to swell the ranks of the unemployed. Such a course would be wrong, and I endorse the action of the Government in retrenching Mr. Geo. Randall, the immigration lecturer, in the United Kingdom. My suggestion is to indent a number of boys annually from the United Kingdom. There are homes such as Dr. Barnardo's from which orphan and destitute boys can be obtained under an agreement for a number of years. Thousands of these boys have been sent to Canada, and have proved so worthy that the Dominion Government have given them free grants of land upon which to commence farming for themselves. I understand the help which these boys have rendered has given a great impetus to the dairying industry in that progressive country. I would get these boys at fourteen years of age, and it would be necessary to have a fixed scale of wages to be controlled by the Government in a similar way to that now in force under the orphanage system, with certain alterations. The first three years the employer will find clothing. On attaining the age of seventeen the boy will have an increased allowance to enable him to buy his own clothing, &c. I will show the age, the amount of wages per year, the rate per week, the weekly value of the quarterly Savings Bank deposit, and the weekly allowance as pocket money :—

Age.	Per Year.	Per Week.	Deposit 3 Per Cent. Savings Bank.	Pocket Money.
	£ s. d.	s. d.	s. d.	s. d.
14 to 15	7 16 0	3 0	2 6	0 6 and clothing
15 to 16	10 8 0	4 0	3 6	0 6 and clothing
16 to 17	13 0 0	5 0	4 6	0 6 and clothing
17 to 18	23 8 0	9 0	6 0	3 0 no clothing
18 to 19	27 6 0	10 6	7 0	3 6 no clothing
19 to 20	31 4 0	12 0	8 0	4 0 no clothing
20 to 21	36 8 0	14 0	9 6	4 6 no clothing

The employer would have paid £149 10s. besides clothing for the first three years, and the young man would have standing to his credit in the Savings Bank on his twenty-first birthday the sum of £114 17s. 1d.—that is including the interest and compound interest. This is without the amounts which he

would have received as pocket money. The employer would have found him suitable board and lodgings during the whole seven years. The amount of the first three years is £2 12s. in excess of the amount charged under the orphanage system. The mother of the late Miss Francis Willard once said that "while heredity counts for much, environment is akin to destiny." I have already pointed out the sins of city life, and I believe that if 100 orphan boys were brought here from England and lived here for seven years in the cities, and then came into possession of this amount of money, fully 90 per cent. would go to the bad. On the other hand, being placed in the country for seven years, with the pure influence of country life, the result would be quite different. The fact of seven years' apprenticeship to the work, and friendships formed in the district, and perhaps affections centered there, would all be in favour of remaining there and having money to begin with. I have no doubt that from these 100 young men would come many farmers and dairymen trained for their life's work. One hundred of these young men would be worth from the Savings Bank deposits alone the sum of, say, £11,400. If 100 young men were to come to Queensland having a full knowledge of local conditions, and possessed of this sum of money, the newspapers would speak in a hopeful strain of the benefits likely to accrue, yet this is quite within our reach and power to bring about. Some people will wonder what the cost will be to the country to indent these boys. I believe the sum of £1,500 would cover every expense incurred in bringing 100 of these boys here, and delivering them into the charge of those who want them; perhaps a smaller sum than is spent on immigration at the present time. Will the person getting a lad pay anything as security to the Government as against failure to meet the quarter's wage? is a question some will ask. I would charge every master £5 before taking the boy. This would give the Government £500, or 33 per cent., of their money back again. Provision would have to be made for sickness if a long one. A light weekly charge of 2d. would more than cover this, and, in the event of a boy dying, the Savings Bank deposit would cover it, without charging the farmer if unwilling to bear the cost himself. In conclusion, I will ask the delegates of this Conference to weigh the matter over well, and tell us where they are going to get their labour in the future. Let us try and get these boys who will become the backbone and mainstay of the country in the days to come.

This was followed by an address on—

ESTABLISHMENT OF LABOURERS' HOMES BY PRACTICAL METHODS.

[By C. P. Mau, Mackay.]

Mr. Chairman and Gentlemen,—In introducing my paper for this Conference, I shall endeavour to show that its object is of vital importance to the State as well as to the employer and labourer.

It is evident, with respect to the relation between employed and employer, that some thing is needed in order to secure for the employer reliable labour, but at the same time secure for the labourer something to occupy himself with when out of employment.

How can we bring this about?

As we all know, more labour is required at harvest time than at any other time of the year.

At the same time, it is out of the question for a farmer or a manufacturer to employ the same number of labourers in the off season as he does in harvest or other busy time; hence labour becomes unreliable more or less for the simple reason that employment is not constant. As a rule, labourers in this country have no homes of their own where they can occupy themselves when out of employment. Some years ago a movement was started by the workers in the Mackay district to petition the Government to cut up some of the reserves into 5-acre blocks for labourers' homes. Our association took the matter up, and advised the Government to that effect. The reply was, that the divisional board had the reserves under their control. That body, however, being adverse to the scheme, the matter dropped. Now, it seems to me that the scheme can be carried out in a practical way very simply and easily.

The Government are now purchasing estates when offered on reasonable terms, which are subsequently cut up into farms, then offered to farmers on a time payment extending over a number of years—an experiment which has proved to be a great success.

Would it not be very simple to so extend the Land Purchase Act that an estate could be cut up (when purchased) into small blocks, say, of 3 to 5 acres in a convenient locality near to some centre where employment is plentiful during harvest time.

Offer these small blocks of land to labourers to make homes for themselves on terms similar to those now offered to farmers. Thus the labourers would be enabled to acquire homes of their own for their families with the money they must now pay in house rent. Moreover, in slack times, there would be employment at home in improving their holdings in various ways. As to the eventual success of the scheme of establishing labourers' homes on the lines here indicated, no doubt exists in my mind from the mere fact that it is so obviously practical.

To bear out my contention, I may say that a similar system is now in vogue on the Continent of Europe, where extra labour in harvest time is practically looked for from the Hausmann, as he is styled.

What is more, employers will have more reliable labour, whilst, at the same time, the labourers will be able to have a little more than a bare house to depend on in the slack season, in the shape of a bit of land (which will be his own) for a garden. A few fowls can be maintained on the land, and a cow can be kept as well as a pig or two. What will that mean to a labouring man with a family to tide them over slack times, instead of wandering into some town, looking for a catch job and spending every penny that might have been saved in harvest time? I must leave that problem to our wise legislators to think out.

I hope and trust this Conference will take this matter into serious consideration, and urge the Government to do something on the lines above indicated. I am sure it will be a great benefit to all concerned, as by doing so we shall take a number of unemployed off the labour market, which will be a very desirable thing to do, considering that the Government is now forced by circumstances to expend money every year in rations to serve out to poor people in order to prevent starvation when out of employment, thereby perhaps encouraging idleness instead of thrift. Anything more that I can say will not make my contention any clearer or more practical; so I will conclude my paper, thanking you for the attentive hearing you have afforded me during its reading.

Mr. W. G. WINNETT (Logan): It is well known that boys are much sought after by farmers, and this suggestion that boys be obtained from Dr. Barnardo's Homes in England will no doubt excite considerable interest. We must recollect that the boys who have been sent to Canada by Dr. Barnardo have had three or four years' previous training, and before they are sent out they must prove themselves useful boys. The majority of those lads that go to Canada ultimately prove valuable citizens, and if 100 of them were brought out here I am sure employment could be found for the lot.

Mr. J. W. LEE (Zillmere): When I was growing cotton I had a number of boys out from Dr. Barnardo's Home, and I must say that the idea of getting them out does not turn out in practice as well as Mr. Dean thinks it would. I found that these boys were very much like the majority of men who come from the old country. When they get here they are naturally liable to change their minds; and, if they think there is some other part of the colony or some other business which they will like better, they go there and leave you, and, in practice, you are powerless to stop them.

Mr. F. W. PEEK (Loganholme) gave his experience of the boys sent to Canada from Dr. Barnardo's Home, and generally favoured Mr. Dean's views on the subject.

Mr. F. J. STEVENS (Mackay): I wrote to Dr. Barnardo some years ago, and he told me he objected to sending his boys anywhere where they would not be under the supervision of his own officers. In Canada they are under supervision for years after they leave England. I think Mr. Mau's scheme of provision being made, when repurchased estates are being cut up, for land for homes for farm labourers, is quite feasible, and that it is one that deserves the earnest consideration of the Government.

Mr. W. D. LAMB (Yangan): As regards Dr. Barnardo's boys, I believe we have some very bright examples of them already here in Queensland; and, moreover, I think that, if these lads can go out to Canada and do well, there is no reason why they should not succeed here. As for Mr. Mau's paper and his idea of three acres and a cow, I may say that, according to my experience, there are generally two classes of farm labourers. The first are the ne'er-do-well's, and the other are the men who strive from the very jump to attain a decent position. You can give a man of the first class as many acres of land as you like, and will see no benefit result; but to put a man of the second class on a couple of acres of land for life savours too much of the old country.

Mr. J. E. DEAN (Maryborough) traversed at length the remarks for and against his advocacy of the introduction of Dr. Barnardo's boys. If a boy cleared out from a farmer he would lose the wages that he had earned to date. A young man twenty-one years of age, with a not inconsiderable amount of money and seven years' experience of farming, would be commencing life in a better position than a good many of the gentlemen here to-day did; and altogether he thought that the number of trained farmers in the country would, in time, be considerably augmented by such a supply of youths.

Mr. C. P. MAU (Mackay): One gentleman stated that there was really nothing to stop the Government utilising a reserve in any manner it thought fit if it were so minded. That may be so, but if you ever apply for a reserve you can never get any reply but that the land in question is under the control of the divisional board or some other body. I do not think the Government will interfere with reserves which have been placed under the control of local authorities. In reply to Mr. Lamb's criticisms, I must say that I think he has mistaken the purport of my paper. The object of that paper was solely for the benefit of labourers who are now wandering about clamouring for work, say, in towns like Mackay, and cannot get it. Why should these men, if they are willing to work, not get it? Why should we not assist them to get a bit of a garden, and when a slack season comes they can go on to that piece of land and make a bit of money? If they have a bit of a home of their own they can add a little to the earnings they may make elsewhere. We should do all we can to make labour reliable. At present we give a man a job, and when it is finished we pay him off and do not worry in the slighest about his future. In any event, such a bit of land as I have referred to would not cost a labourer any more than ordinary house rent would. I think the Government ought to give the system a practical trial, and I am convinced that it would be successful, for I come from a country where it is successful.

Mr. P. MCLEAN (Agricultural Department): When Mr. Cowley was Secretary for Agriculture, he thought that the idea would be worth trying, of getting a number of boys and supplying farmers with them. The proposal was made public through the Press, and a considerable number of boys were collected and placed on farms. I am sorry to say that the scheme was not a success. I have known boys, however, taken from our orphanages and reformatory, who were placed with farmers with advantage to all parties. With respect to settling people on small areas of land, it will perhaps be remembered that, fifteen or sixteen years ago, New Zealand was going through a crisis similar to what we are passing through now—that is, there was a large deficit in the Treasury, there was a large number of unemployed, and every person who could scrape up money was leaving the colony. New Zealand has long been the country of experiments, and the Government of the day tried the experiment of homestead settlements—that is, they cut up land into small blocks running from 5 to 20 acres. Money was advanced for clearing, for laying the land down in grass, for building houses, &c. Several of these village settlements were established in both the North and South Islands of New Zealand; and the Queensland Government was so impressed with the idea of the project that I was sent over to New Zealand to inquire into it. This I did in 1887. I remember at one of those settlements in New Zealand getting into conversation with some of the people who had been in the country before the village settle-

ments had been established. I asked one young fellow how it would work. His reply was that he and a number of the old settlers who had been in the district for years would have to hump their blueys and clear out, as there was not enough work in the district for both them and the new men that the Government had placed in their midst. This scheme of Mr. Mau's has apparently the object of assisting in the providing of a regular supply of reliable labour for work in the canefields and sugar-houses. It is, however, the planters who would benefit from such labour, and, as many of them own large estates in the sugar districts, many will probably think that they should be first approached with the object of getting them to cut up portions of their lands into 5-acre blocks. This system is carried out in the old land, where the population is different in its condition and in its aspirations to what we have here. Men here will not settle down for life on 5-acre blocks of land, and in any event there are plenty of private landowners who can cut up land for the purpose of providing themselves with a supply of labour.

FIFTH SESSION.

WEDNESDAY, 11TH JUNE, 1902, 9·30 A.M.

Mr. D. SMITH, of Roma, then submitted the following suggestions relative to the clearing of land by the Government to encourage settlement—

EXPERIMENTAL FARM BY THE GOVERNMENT ON A LARGE SCALE.

[By DANIEL SMITH, Yingerbay.]

GENTLEMEN,—We wish to bring forward and introduce to the people of this State a scheme which we consider is the most important, desirable, and profitable investment that could be made for the benefit of the whole country in general, and which would form a stronghold against these disastrous droughts, advance the knowledge of agriculture, encourage settlement, and prove a great stand-by for the district. That is an experimental farm by the Government on a large scale. The idea is this—

1. Choose 20,000 acres of land containing all the different varieties of soil.
2. Cultivate 10,000 acres or whatever quantity is required, and grow what kind of crops the soil will produce for future requirements.
3. Store up every kind of produce for future requirements.
4. Breed cattle, horses, sheep, pigs, and poultry from the very best herds and stock procurable.
5. The people then would have a good valuable stock for the district instead of continually breeding from inferior stock.
6. To stand these disastrous droughts, we must look to the growing of crops and the laying-up of a large supply of food for man and beast.
7. The present system of depending too much on next year's crops is defective, as we leave ourselves open to a fearful calamity if it happens to keep dry and no crops are harvested for two seasons.

GOVERNMENT CLEARING LAND TO ENCOURAGE SETTLEMENT.

Owing to the extreme depression now existing in the land from these bad times, we must adopt some method of creating more circulation of capital and closer settlement of the people on the land. We wish to suggest what we consider would prove a productive outlay—

1. Choose spots suitable for agriculture.
2. The Government to have the land cleared, and then to throw it open for selections on easy terms.
3. The benefits, we consider, are as follow—
4. Giving employment to people.
5. Encouragement to village settlement.
6. Distributing capital on a productive outlay.
7. Assisting and inducing people to go on the land by giving them the means to do so.

8. Land is now lying idle and is rapidly deteriorating by the growth of timber and prickly pear.

9. We consider the land when cleared would be selected at once and be eagerly inquired for.

10. This scheme would do away with the heavy burden that rests on the poor man, and the people would have the land under crops a good many years sooner.

11. The money spent by the Government would be quickly repaid, for men would prefer to pay for cleared land, as they could get a return quickly.

12. This would increase the wealth of the district, and give considerable amount of profitable employment to the poor man and increase population.

Mr. A. CAMPBELL (Ripple Creek), in the course of a very able and interesting speech, pointed out that if the Government undertook to clear land it would doubtless encourage settlement; but they might as well ask the Government to stump and plough the land, sow the seed, and harvest the crop. Moreover, if land were cleared and were not immediately taken up, it would soon be covered with a flourishing crop of undergrowth, so that the original outlay in clearing would be thrown away. Altogether the speaker thought the adoption of the proposal, particularly at the present time, would be inadvisable.

Mr. FRED. SMITH (Crow's Nest) adopted a similar view to the foregoing speaker, and thought that, instead of clearing land, the Government could better spend money in constructing railways to assist those who at present were seriously handicapped through their practical inability to get their produce to market.

Mr. J. G. PALETHORPE (Toowoomba) considered that, if a man took up 100 acres of prickly pear country and cleared it, the Government should give him his title deeds free of any further payment. Any man who took up prickly pear country between Toowoomba and Dulacca and cleared it, deserved such a concession from the Government. Mr. Palethorpe, however, was not in favour of the Government clearing land for a selector.

Mr. J. C. NEILSEN (Laidley) thought that if the suggestions in the paper applied to such prickly pear country as that about Dalby there might be something in it; otherwise he was opposed to the measure.

Mr. A. GRANT (Rosewood) was also opposed to the measure, and thought that if a man, considering the liberal terms under which land was obtainable, could not clear it and make a home for himself, he ought to go in for something else than farming.

Mr. J. E. DEAN (Maryborough) favoured the construction of new railways in agricultural areas in preference to clearing a selector's land for him.

Mr. D. SMITH (Roma), in reply, pointed out that during the past five or six years numbers of men had settled in his district. These men had started with small capital, had sunk that in clearing, had got into debt, and had been struggling along ever since. In a very large number of cases, all the capital a selector started with was expended in clearing, whereas, if the land were first of all cleared by the Government, the selector would start with better prospects of ultimate success, and the Government could be recouped for its expenditure by charging a higher rental or purchase money. Mr. Smith contended that the adoption of his proposals would greatly assist in the development of settlement in the drier parts of the State.

The CHAIRMAN pointed out that the remarks made, if not actually hostile to Mr. Smith's suggestions, had not been sympathetic, and most of those who spoke appeared to think that any assistance that might be rendered by the Government should not take the form of clearing the land. He did not think it was his function to take sides in a debate of the kind they had just had, but he would point out that they had at present a public debt of about £40,000,000, that last year they had a deficit of £500,000, and that this year things did not look too promising. Every request that the Government should expend money was a request that the Government should tax the people, and the Government had no money which it did not take from the taxpayers. So such matters as more

railways, more harbour accommodation, &c., which the Government was requested every now and then to undertake, all required money. Whenever the public at large demanded that the Government should do something involving the expenditure of money, then that demand was equivalent sooner or later to a demand that the people should pay more money to the Treasurer. That was a matter that was worthy of consideration. It was impossible for the people of Queensland to expend money without the Government at the same time squeezing them and demanding that they should pay more taxation. The fact that the Government is the people was apt, however, to drop out of one's perception. The Government had no sources whatever from which to find those various things which were so frequently asked for other than the pockets of the people. He thought that the fact that they had £40,000,000 of debt, and the fact that their business of last year had turned out so disastrously, should be borne in mind in all these matters, and that they should ask themselves how far it was prudent to ask the Government to take upon itself duties which would involve a further demand upon the pockets of the taxpayers.

EXTENSION OF THE SCOPE OF THE AGRICULTURAL BANK ACT.

Mr. C. P. MAU (Mackay): In discussing this question I would like to record as a motion for the consideration of the Resolutions Committee the desirability of so extending the scope of the present Agricultural Bank Act as to assist those already involved, also for assisting in the purchase of land and stock. In clause 18 of the present Act it says that no money is to be granted to relieve mortgages or other charges. So far as the present Act goes, it has some very good provisions, but the money available from it appears to be earmarked for a certain class of people. It is feasible to expect that there are men who have been here from twenty to thirty years who may deserve help. In my opinion, interest is the worst of all evils in the agricultural community, and I have nothing to find fault with in the Agricultural Bank Act except that it should be equal for all. I think that, provided his security is good, every farmer should have a chance of enjoying the privileges of the bank. In South Australia they have a Land Bank which allows this. Our society has been communicating with the administrators of that bank, and we have got the following facts from them: In their bank, advances are made in cases such as I am referring to, to the extent of three-fifths of the value, determined by a valuation of the land offered as security. If the purchaser is able to pay half of the purchase money, and the bank considers the price a fair one, the balance would be advanced, provided the property were duly mortgaged to the bank. In ordinary cases the bank does not inquire into the disposal of the money advanced, and it can be utilised for the purchase of stock or for any other purpose that the mortgagor may desire. That shows that in South Australia they assist the old settler as well as the new comer. I am also advised that, notwithstanding that South Australia, along with the rest of the Commonwealth, has experienced a succession of bad seasons, the borrowers have met their obligations in an exceedingly satisfactory manner. Reliable labour in Queensland seems as if it is going to be a thing of the past, and we now have to look forward to reliable money. It may be said that if the provisions of the Act were extended we would not be able to get enough money to run the bank, but I feel certain that sufficient could be raised from the people. All we wish from the Government is the administration of the Act—that is, we want it to help us to organise so that we can help ourselves. I want to impress upon everyone that I mean to get my resolution passed if possible, and if I thought I had no chance of getting support from my brother farmers I would not waste time on the matter. The *Queensland Hansard* will prove that when this measure was going through the House there were a good many men who were quite in accord with what I am advocating. Mr. Armstrong was in favour of it, and so was Mr. Tolmie, of Toowoomba, but the Bill was brought in so late in the session that these and other members were afraid to insist on what they felt certain would be an

improvement to the measure, because if everyone started tinkering with it, it might not have passed at all. My association is also down on the programme as suggested, that a discussion take place on the need for securing to outgoing tenants compensation for improvements effected by them during their tenure that are, at the expiration of their occupancy, of direct or realisable monetary value. This matter of tenant right is an important subject in our district, and our association has paid a good deal of attention to it. There are a lot of people up there who grow cane on a royalty, and it is thought that if they put improvements on their land they should be entitled to some compensation when they leave it. The farmer does not ask for anything unreasonable, but simply that he should be allowed to take away what is his own. It is as just and as reasonable that an outgoing tenant should be allowed to take away from a farm what he has put on to it as it is for him to take away a team of horses. Many of the tenant farmers up there are not living in decent dwellings, simply because if they put up a good house they would have to leave it to the landlord. Some time ago Dr. Maxwell had a very enthusiastic meeting in Mackay, and, upon application for advice, he told them he could give them no advice until they had tenant right. It is only fair that farmers should be able to insist on the insertion in their leases of some clause to that effect.

Mr. H. A. TARDENT (Dallarnil) seconded Mr. Mau's resolution about the extension of the provisions of the Agricultural Bank Act.

Mr. J. E. DEAN (Maryborough) thought that the bank in its present form would allow one man to go in for luxuries. Another man, perhaps, who, from circumstances over which he had no control, had become involved, would require money to carry on his farming operations, but would be unable to obtain any assistance from the bank.

Mr. A. W. CAMERON (Maryborough): I have every sympathy with Mr. Mau's proposals and hopes that the bank should be in a position so as to be able to render assistance to the old settlers. I am quite satisfied, however, that the trustees of the bank, after they get it into working order, and can do it on purely commercial principles, will extend its operations so as to include those men. But to place in the Bill from the very start that the bank was going to relieve all the people who were involved and had millstones round their necks, would be a rather heavy contract for the Government to take on from the jump. We cannot get away from the vital principle that the operations of this bank must be conducted on purely commercial principles and on as conservative lines as any other financial institution. Interest is perhaps a heavy charge on the profits of a man's farming operations, but of course there is a lot of speculative money-lending done, and the borrower bears the weight of it. The Act that we now have must be worked on conservative lines, and its administrators must not consider the question of the popularity or otherwise of the measure. Before they lend money they should be certain that every penny of it will be paid back or can be recovered. Some think that the Government should not inquire into what the borrowers are going to do with the money that is advanced to them, but I consider that is a most essential point. Before I lent money I should insist on knowing what the borrower was going to do with it. He would have to improve his farm, and thereby improve his means of obtaining a better livelihood. This measure, although successful in other countries, is largely an experiment in Queensland, and I am with the Government in hedging it round with such precautions as will ensure its success from the start. We do not want any failures, and when the Government feels its footing I feel sure that it will enlarge the scope of the bank. Although I use the word "Government," I hope and believe that the bank will not be under Government control. No man should be, nor do I think he will be, able to go first to the trustees and afterwards to the Minister to get the latter to enforce his claim for an advance which the trustees were not disposed to give.

Mr. W. DEACON (Allora): Mr. Mau advocates that this Agricultural Bank Act should apply to all settlers at present on the land, as the New Zealand Agricultural Bank does, and I am altogether with him. Mr. Cameron said that although this measure was a success in other countries it was only an experiment in Queensland, but why should it not be a success in Queensland also? If you go into any British community the world over, you will find the people all alike. In each community they have the same principles of honesty, the same pluck, the same energy, and they are all able to make good use of money. The Government will do well to take care that political influence shall have nothing whatever to do with the bank, and that no one gets his land overvalued. Three-fifths of its value is quite enough to advance upon any land. I know there is a feeling among the farmers that the bank as it now stands will only help the new settler, who is getting a good deal of help as it is. You help him to buy the land and help him to get a start, but to the men who have borne the heat and the burden of the day you refuse help. It is all right to say that money is available at cheap rates, but in practice this is only the case where large sums are borrowed. The small men who borrow small sums have to pay fairly heavily for their accommodation.

Mr. F. W. PEEK (Loganholme) spoke in favour of securing relief for the old settlers.

Mr. F. W. WARMINGTON (Degilbo): Mr. Mau has touched very ably upon what many will consider as the great defect in the present Agricultural Bank Act, and a good many, including even, I believe, some of those who voted for it in Parliament, were under the impression that it would provide relief for the old pioneers. Of course the operations of the Act extend to the old so-called big farmers, but the small men who have borne the brunt of the battle, and may have, perhaps, a small lien on their land, are unable to obtain any assistance from the Government under the Bank Act as it is now constituted. The other subject introduced by Mr. Mau—namely, that of tenant right—is a very important one, and I trust some modicum of relief will be extended to farmers in that direction.

Mr. W. MISCAMBLE (Roma) followed in the same strain. He thought that assistance should be extended to those men who have laid the foundations of agriculture throughout Queensland. It was hardly just to bring new settlers to a district and give them money at 5 per cent. to compete with the old settlers who were denied the privilege of also obtaining cheap money. He did not object to the new men being provided with facilities for financial accommodation, provided the old settlers were treated in a similar way.

Mr. W. NOTT (Biggenden) thought that the old pioneer had as much right to obtain money at 5 per cent. as the new man who had been put alongside a railway line on the best land that could be found for him.

The CHAIRMAN: There seems to be an impression that a difference has been made in connection with the Agricultural Bank between the old settlers and the new ones. There is no difference whatever. The application of every man will be dealt with upon its merits. The object of the Government in introducing the Bill was not, whatever may be done in the future, to take up the mortgages of those persons who had been unfortunate enough to find it necessary to borrow. Seeing that a great many of the old settlers were graziers, and seeing that this motion is brought forward by a graziers' association, seeing that there have been 12,000,000 sheep lost through the drought, to compensate these gentlemen for their losses, or to take up their mortgages, is a task which would be beyond the ability of the Government. The late Minister for Agriculture was largely responsible for the present Act, and I know the system upon which the Bill is based. To some extent it is taken from the German plan, but with this difference: Instead of co-operative credit—which is, I believe, almost impossible to hope for in this country—there is State

credit. But the object for which that credit was to be obtained, was that the money obtained from the co-operative land bank was money which should be devoted, not to getting rid of debts, but for some improvements which would place the farmer upon a better position. Whether it was wrong or right, that was the object with which that Bill was brought in. The idea was that the money lent should be applied to some object which would place the borrower in a better position, and the bank was to inquire into the particular improvement which the farmer intended to make. If a settler goes to the Agricultural Bank—and I may observe that it has been constituted so as to be out of Government control—he is not asked how long he has been on his farm, but what does he want: what security he can offer, and how does he propose to apply the money; will it add to his wealth and improve his position? The trustees will not ask whether he is an old or a new settler. The trustees will advance him money for the purpose of constructing dams or for purchasing machinery for irrigation. If a man has been thirty years a farmer, and has a freehold, he will be able to obtain the assistance of the bank. One of the first objects of the measure was to enable people to improve their position, and the next was to meet a class of settlers who had purchased land from the Government, but who had not paid up their instalments. I have been informed that the ruling rate in Brisbane by financial institutions such as insurance companies—and I believe these latter advance pretty freely on Darling Downs properties, because the security is looked upon as undeniable—is form 4½ to 5 per cent. I believe the Government, if you include charges, does not get money at much under 4 per cent. Men with good freehold land have really not much difficulty in getting money at reasonable rates from the financial institutions, but, as I have already stated, there is a class of settlers who may be said to practically own land, but their possession of it is still not definite enough to justify an institution advancing money upon it as a security. These selectors may have the land under an extended lease or they may not have got their certificates of residence, and, under the circumstances, however desirable members of society these men may be, it is impossible for them to obtain advances from a bank upon the land they occupy, because banks only advance upon freeholds. It was partly with the object of meeting these men that this Agricultural Bank Bill was brought forward. In their case the State, being the landlord, could resume possession of the holding in the event of the tenant's default, and consequently was the only party that could lend money on such holding with the absolute certainty of being in a position to take the land if the amount advanced on it was not repaid. [And because the State thus possessed a special security, and, in consequence of its being, as it were, a preferential creditor, the fact would probably prevent any other people from making advances. So it was considered desirable to institute some machinery which would deal with this class of case. It may be thought that the State Bank should make advances not to one class, but to all classes, as they do in New Zealand, and on various securities, but that, of course, is a matter for Parliament. It is a matter upon which you can very profitably express an opinion. It is a matter of entering into rivalry with other banks and of rendering financial assistance to graziers as well as to agriculturists. I do not know but that the man who has a small herd of cattle, and who certainly has his struggles, does not also deserve some consideration. He assuredly is one of that class of men who obtain their living from the land. The present bank, however, was established, as I have explained, on particular lines—namely, to advance money to improve the property of settlers and also to make advances to a class of settlers somewhat peculiarly situated. The making of advances generally to all classes of persons who are deserving would require at the very least £3,000,000. Probably politicians will think that it is as well that this scheme as it now stands should be tried for some short time before we take any further steps in that direction. That is the view that I have heard expressed, and it is not, I think, altogether without some reasonable justification.

Mr. W. ATKINSON (Danderoo): Would the trustees refuse a grant of money to a person having freehold security to offer, but who was not going to improve his property?

The Hon. D. H. DALRYMPLE: Yes; they would refuse the application. The main condition on which an advance will be made is, that it will be spent on additional improvements. In the first place, this increases the wealth of the community, and in the second it will increase the value of the security.

Mr. ATKINSON (Danderoo): The man might want the money to buy fresh property with.

The Hon. D. H. DALRYMPLE: The trustees cannot advance money for that purpose.

Mr. C. P. MAU (Mackay): With respect to the remarks made on the subject of inspection, I must say that we shall have to be very particular in the matter of appointing inspectors, and see that they are men who know something about farming. If you get men who know nothing about the industry you will hamper the measure. The Chairman, in his remarks, implied that the Act as it now stands contains the objects of the fathers of the measure, but those who asked for the Act know very well that we did not get what we asked for by a very long way. Mr. Chataway sent the draft Bill to the Pioneer River Farmers' Association, and we suggested several amendments, and I must say that it was very unfortunate Mr. Chataway was taken away before the Bill finally went through. I do not advocate that a man who is involved should be relieved of his financial difficulties, no matter what he owes. My contention is that if his security is as good as another man's, he is just as much entitled to a loan.

Owing to the want of time, Mr. QUINNELL did not read his paper on "The Injurious Effect of Sorghum on Stock," but gave a very interesting address on the subject of it. In a future issue of the *Journal* the full text will be published. The following contains, however, the gist of the paper:—

The object of this paper was to show as clearly as possible, and with scientific exactitude, certain physiological facts and well-defined pathological characters that went to prove the mystery of death from sorghum feeding was due to derangement of the digestive apparatus—resulting from errors in feeding—and not to any toxic influence. He then dealt in detail with the various circumstances and conditions under which sorghum was believed to become poisonous. The many theories published, however, proved that little was yet known with regard to the "pathogeny" or generation of the malady. Mr. Quinnell then went on to a botanical description of sorghum; and then drew attention to the pubescent growth on the sorghum—viz., downy, with short soft hairs. Having failed to find a reference to these pubescent growths, he was obliged to assume that it was now recorded for the first time. Their presence may provide a physiological factor in the causation of the malady by mechanical irritation, similar to the very fine hairs on young bamboo shoots. An extract was read of the effects of these bamboo hairs in bamboo shoots, which were very fatal to humanity. All plants contained, often in large proportions, cellulose or vegetable fibre familiar as cotton wool and paper. When very young it may be digested, but with growth it becomes woody and is not only itself indigestible, but hindered the digestion of other substances. Herbivorous animals required to supplement their vegetable diet by the use of common salt. Therefore, salt is absolutely necessary for stock at all times, and in all places; either separately or in their food. They required it especially in the spring, according to Willard, for then, he says, there is less saline matter in the pastures than at other times. Scarcely any single green fodder was suited for forming the single food for stock. Even good green fodder may bring on an attack of "hoven" or other gastric trouble—in any case where animals, which have fasted for a long time, are supplied with a large amount. An artificial mode of existence forced on animals' predilections which in a state of nature are not observed. In nature they are essentially moderate in their desires, but under domestication would eat what they would in a state of nature avoid, and never appear to be satisfied. Stock would sometimes kill themselves by over-feeding when food is continually placed before them, but that is only when they are, from their surrounding circumstances, relieved from travelling for food and water. Mr. Quinnell then proceeded to trace, with the aid of maps, the process of digestion in ruminants. After showing the distinct operations in the four gastric compartments, Mr. Quinnell went on to show that rumination did not, as a

rule, commence until after the animals had been watered, unless fed on green fodder or succulent roots, and even then they sometimes require water. Ruminant animals, being very timid, were easily frightened, and very slight causes arrested rumination, as did slight maladies and excessive food and grasses in the stomach, venomous or narcotic plants, forced marches, fatigue, rut, and suffering of all kinds. Even the separation of a mother from her young had been known to temporarily arrest rumination. The longer rumination was postponed the more difficult was its recommencement, since food becomes dry and compactly packed in the rumen, and the omasum and their membranes become irritated. Mr. Quinnell also explained the paralysing influences of a too far distended paunch, and the tardy action of many medicines administered was due to the thick epithalical covering and the amount of food always lodged in the three stomachs. When the stomach was distended a certain nerve was unduly pressed upon, and so got into a torpid state, and the lethargic symptoms of comatose staggers were supposed to be the result, by reflex nervous action. Another theory was also given for this. Mr. Quinnell then went into the details of engorgement, which was not easy to treat medicinally. He, therefore, strongly urged precautionary measures, care in feeding, &c. Sorghum, botanically, may be classed with the best of fodder plants. Chemically, it was in harmony with what was known of the chemistry of all fodder plants. Careful chemical analysis to isolate and identify poisonous matter had utterly failed. A poison that would kill a full-grown animal in ten to fifteen minutes must necessarily be present in relatively large proportions. Analysis had shown a trace of potassium nitrate, but therapeutics controvert its toxic influence. Cultures made with the object of developing toxic bacteria gave negative results. The entomologist had declared specimens taken from patches where sorghum had produced fatal results to be free from insect or parasitical growths. Physologically, it had been demonstrated that in the use of sorghum for pasturage the element of danger was not any greater than that to be found in indigestible fodder of any sort, and especially stale, or old, or tough green meal. Pathologically, it had proved its ill effects to a derangement mechanically produced, and hence did not support the chemical theory of poisonous intoxication. Stockmen generally were agreed that hungry cattle should not be turned on the sorghum pasture even for a short time; therefore, the more enlightened dairy farmer should know that sorghum was not any more a stock-killer than the usual fodder plants were, if he will only adopt the precautionary measures that practical experience and science dictate.

DISCUSSION.

Messrs. A. GRANT and W. BERLIN (Rosewood) described the injurious effects of grazing cattle on sorghum pasture, as did Mr. F. DREW (Laidley) and Mr. J. Gillam (Allora).

A delegate suggested that the deaths that often occurred after eating sorghum perhaps arose through the presence of a poisonous weed growing amongst the sorghum.

Mr. A. H. MCSHANE (Toowoomba): I do not care much about sorghum myself. A year or two ago a neighbour of mine had a lot of deaths from sorghum, and communicated with the Department in the matter. The reply was that the Department could only account for the deaths by the cattle eating some poisonous weed that was with the sorghum. But why did not the weed occur amongst other fodders and grasses, and why was it confined to sorghum? If the Department could throw any light on the subject it would do a great amount of good.

Messrs. D. WEBSTER, E. S. WALLER, and W. DEACON also contributed to the discussion; the latter stating that he had fed sorghum to his cattle and no ill effects followed. He was doubtful if any case of sorghum poisoning had occurred in the Allora district.

Mr. QUINNELL, in reply, pointed out that it was possible, through irritation, to set the paralysed stomach of a cow going. Poison must be chemically introduced into the animal's system. The animal would live a long time before poison would act. There were no symptoms of this sort, but there was evidence to show that mechanical action was the cause of the death. It was necessary to have mixed foods. As for chaffing, if a poison exists in the plant, chaffing will not eliminate it. Acute indigestion was the cause of the deaths complained of. The only treatment was precautionary measures, as drugs would not act quickly enough before death ensued.

Mr. J. W. LEE, of Zillmere, then read the following paper on :—

THE ATMOSPHERE.

[By J. W. LEE, Zillmere.]

GENTLEMEN,—The subject of the paper I purpose reading to this Conference is the atmosphere—its composition and its action on soils, plants, and animals. I am convinced, gentlemen, that this subject is one of considerable importance to all those engaged in the tillage of the soil as agriculturists or horticulturists.

I may state that the atmosphere was the first agency employed to produce a soil capable of tillage, and of bringing forth the fruits of the earth. But I fear I shall not be able to more than touch the fringe, so to speak, of this subject in the time allowable in this Conference. I shall, however, in the first place, endeavour to explain what the atmosphere is composed of, and I may state, in passing, that of the three materials forming our globe and its envelope—namely, solids, liquids, and gases, as the atmosphere—the latter is by far the least understood by the general public, and the reason no doubt is that the two former make themselves more forcibly known to us through our senses of sight and touch. We can see water, and we can direct its course. We can handle the solids of our globe, and feel their resisting powers in ploughing and digging. But the atmosphere appears to be beyond our grasp. I have just stated that the atmosphere is one of the three materials which belongs to our globe, and I desire to press on you this fact: That the atmosphere is a material substance, though we cannot see it. It has force; it can be measured and weighed—one cubic foot weighs 527 gr. or about $1\frac{1}{4}$ oz., and is 715 times lighter than water. The pressure of this atmosphere on the surface of the earth is 15 lb. to the square inch of surface. This fact I wish you to bear in mind, as I shall have to refer to it again as an important feature in connection with the tillage of our land. Many other interesting statements might be made in reference to atmospheric influence in connection with tornadoes and cyclones, which are merely the atmosphere in a rage—in other words, wind is but the atmosphere in motion. Having stated in my previous remarks that the air is a material substance, I shall now proceed to consider what it is composed of, and how these components act on the soil, on plant, and animal life. The air around us is composed of a variety of gases, the chief of which are—1st, nitrogen; 2nd, oxygen; and, incidentally, carbonic acid gas, ammonia, nitric acid, and watery vapour.

All these gases are needed in the atmosphere for the support of both plants and animals, and also for the purpose of assisting in reducing the soil from an insoluble to a soluble condition. Some of the above-named gases are in the air in very small quantities, nitrogen and oxygen occupying by far the largest space—namely, nitrogen about four-fifths, and oxygen one-fifth; and the rest of the gases named are present in very small proportions indeed, but are so wonderfully blended and arranged by the Supreme Being that the greatest harmony prevails and the utmost benefits are conferred on both animal and vegetable life.

I shall now attempt to explain some of the characteristics of these gases. 1st. Nitrogen, which occupies four-fifths of the atmosphere, is generally known for its inactive or indifferent qualities, and in its gaseous form appears chiefly to exist for the purpose of curbing the impetuosity of its too active companion, oxygen gas. But in its solid form it is one of the most important ingredients in the formation of plants, producing food for both man and beasts, and the value of such foods is generally estimated by the proportion of nitrogen they contain.

We shall next consider the oxygen gas, found in the atmosphere in the proportion of one-fifth of the whole. This is the most active and powerful agent in the air. To relate all the manifold operations of Nature in which oxygen is employed would take up too much time and space. I shall, therefore, only refer to a few which most interest those engaged in the tillage of the soil.

In the first place, it is a fact that this gas, in company with that of carbonic acid, may be truly looked upon as being the father of our soils, for it was this gas that first penetrated the primitive rocks by its silent but irresistible power, reducing them to the small particles we call soils. And this work is still going on every day, grinding even those particles to a finer powder, and thus liberating, slowly but surely, the plant food they contain. As a proof of the power of this gas, I might refer to what some of us, no doubt, have often seen in the old land—viz., the old castles and cathedrals, some of which have been standing for some 600 years. We have seen the shattered or shaley condition of the outside of those buildings. This, I may state, is the work of this powerful disintegrating agent, oxygen gas. We may think it strange that a mere gas can produce such effect upon even the hardest granite rocks, and yet we can

neither see nor hear it at work. But it is a fact, and I may further state that this same agent would even reduce a rock of iron to powder in time, and, as a proof of this, I might refer to what is too commonly seen on many of our farms—that is, a bright plough left out in the open field. If left there for two or three days and nights, what do we see? The silvery bright work is turned into a red rust. When this rust is dry you may brush it off in dust; this dust is known as oxide of iron, commonly called iron rust. This, too, is the powerful work of this oxygen gas on the iron of the plough.

Let us suppose for a moment that the proportions of these two gases were reversed, and we had only one-fifth of nitrogen and four-fifths of oxygen. We should find that the bright plough referred to would be reduced to powder in one night, and the whole face of what we call Nature would be changed into a barren wilderness, for no plant or animal could possibly live on the earth.

It is a well-known fact that, if a piece of iron were to be placed in a vessel containing pure oxygen gas, it would be reduced to oxide of iron in a few seconds; thus showing that even a rock of iron could not resist the disintegrating power of this oxygen gas.

We see, then, the gases of the atmosphere have been wisely blended for the production of the greatest amount of good to both vegetable and animal life with the least amount of evil.

But it may be asked: How does this gas affect the plants and the soil? To this I reply that oxygen gas is one of those fluids which carry food to plants through their leaves, for it is well known that plants feed largely through their leaves as well as through their roots. But this gas not only carries food of an organic nature to the plant through its leaves, but it is also a powerful agent, *if permitted to enter the soil*, in providing food of an inorganic nature to be taken in by the roots of plants, for all food of an organic nature required by plants is supplied from the atmosphere through their leaves, but foods of an inorganic nature are taken in by plants through their roots in a liquid state. But if our lands have a hard and weedy surface, and are not drained, then I say it is impossible for this or any other gas to penetrate the soil and assist the farmer.

I must now leave this gas for the present, though much more of an interesting nature might be said in reference to it; but I must pay some attention to the other gases referred to as being components of the atmosphere, and the next I will refer to is that known as carbonic acid gas. This gas is a close companion of the last-named oxygen, and is present in the air in the very small proportion of about 1 in 2,000 parts. In itself it is a deadly poison to animal life, and is also the heaviest gas in the whole air, and were it not for a very wise law which is always at work in and around us, called the law of diffusion, no animal would be able to live close to the earth, because this gas, being, as I said, the heaviest and so very poisonous, would always be nearest the earth's surface, and would thus prove fatal to animal life.

But, while this gas is so injurious to man and other animals, it is one of the most invigorating of organic foods for plants in the form of gas. It is also worthy of note that, while plants are continually absorbing this carbonic acid gas, it is continually being ejected from their bodies by the whole animal creation, man included, thus keeping up a constant supply for plant food and life. This gas is not only an organic plant food when taken in through their leaves in a free state, but is also, like its companion oxygen, a powerful agent when permitted to enter the soil, as it enters into a combination with other substances and assists in the disintegration of the soil, setting at liberty fresh supplies of food to be dissolved in water and taken up by the roots of plants. The next component of the atmosphere is ammonia, commonly called hartshorn, and is composed of two others—viz., nitrogen and hydrogen in combination—and is easily known by its strong pungent smell. Ammonia in its free state is, like carbonic acid, a plant food, and is taken in through the leaves of plants. This gas also, if permitted, enters the soil and assists in reducing the insoluble portions of the earth to a soluble condition to be taken up by the roots of plants. I am afraid that your patience will not allow me to more than just name the two other components of the air—viz., nitric acid and watery vapour.

It is supposed that this nitric acid, which exists in very small quantities, but yet in sufficient quantity to supply the crops on our lands with very valuable plant food, is formed by the combination of two other gases, and which I have before named—oxygen and nitrogen. This combination produces lightning, and the acid thus formed is dissolved by rain, and so comes down to our plants. It is this acid that gives to our crops such a healthy appearance after thunder showers. I shall now very briefly refer to the lastnamed of the components of the atmosphere—watery vapour—which is simply water in the form of steam, and is produced by the rays of the sun drawing up water from the seas, rivers, and lakes, and, by the law before referred to—viz., diffusion of gases—is distributed through the whole atmosphere. This vapour has

a wonderful effect on both plants and animals—on plants as seen in the refreshing early dews, and on animals in toning down the powerful gases referred to which all animals are continually breathing; and which, were it not for this vapour, would be very injurious to both the vegetable and animal kingdom.

We have all both seen and felt the effects of a deficiency of this watery vapour, when we have experienced those cold, withering, westerly winds in our winter months. The ill effects produced on our crops at this season of the year are chiefly due to the lack of this watery vapour. It is well known that we have far less of this vapour in our winter months than in summer in this climate.

In conclusion, gentlemen, it may be you will see with me that in the atmosphere the tillers of the soil have many willing friends ready to help if only an opportunity be afforded them to do so, and the beauty of these helpers is that they are never tired; they need no calling in the morning; they never complain nor strike for more wages.

But some may ask, How are we to avail ourselves of these helpers? My answer is—

1. Let us have our lands well drained, remembering what has been before stated—that the atmosphere is pressing for admission at the rate of 15 lb. to every square inch of surface. But, where water is free, atmospheric air can never enter. For we have seen before that air is 715 times lighter than water, and, therefore, can never displace it. But remove the water by drains of some sort. Pipe drains are by far the best, and I believe in the end the cheapest, and, as the water moves, the air is waiting and pressing to follow and to do the work it is destined to do. Remember also that water in motion is life to all plants, but stagnant water is positive death to most plants.

2. Another way to secure these friendly helps is to keep the surface of our farms loose and open, for neither water nor atmosphere can easily penetrate a hard-caked surface. They are waiting to enter the land, but the door is locked.

3. We can avail ourselves of the assistance of these gases in a free state by giving our plants plenty of room for the air to go in and out amongst them, not forgetting that plants as well as animals live by breathing.

I, therefore, think that with good and deep cultivation, loose surface, thorough drainage, and judicious irrigation we shall secure from the atmosphere all the benefits it was intended to give to man.

SIXTH SESSION.

WEDNESDAY, 11TH JUNE, 1902. 7·30 P.M.

Mr. LESLIE G. CORRIE, of Brisbane, then read his paper on—

THE ORGANISATION OF AGRICULTURAL SOCIETIES.

[By L. G. CORRIE, Brisbane.]

A man, be the Heavens praised, is sufficient for himself; yet were ten men, united in love, capable of being and doing what ten thousand singly would fail in.—CARLYLE.

During the last forty years the business progress of the world has been greatly quickened by one or other method of co-operation.

Everyone knows what splendid work the Right Hon. Horace Plunkett has been doing in Ireland, through his Department of Agriculture and Technical Education, in the way of organising and teaching the farmers.

In England the Agricultural Organisation Society, Limited, was created for the sole purpose of instructing farmers how to combine, and to assist them in registering their societies, while the British Government has provided the Industrial and Provident Societies Act, which enables all such societies to register and obtain a corporate existence entirely free of cost.

Viewed from a practical standpoint no class in Australia has received so meagre a direct return from co-operation as the men using the lands of this continent.

In spite of the conspicuous benefits secured by Australian pastoralists from the union which was forced upon them some years ago, those interested in other agricultural callings have failed to attain to the strength which can only be reached through comprehensive union. Confining ourselves to Queensland, we note many associations promoted by various classes of agriculturists in the desire to benefit from mutual endeavour; from the least prosperous of these a measure of good has doubtless resulted, some have rendered special service along certain lines, and the more or less general benefits indirectly accruing may warrant the existence of most of such organisations, still the direct advantages secured have been in poor ratio to the numerical and monetary strength involved.

Various reasons for this state of things are advanced, one of which it is now proposed to consider—viz., the want of organisation amongst the organisations, a want which has certainly led to an almost incredible amount of over-lapping occurring and repetitional work being done.

At the Warwick Conference, the late Minister for Agriculture, whilst deploring the fact that farmers seemed very unenthusiastic concerning practical co-operation, said he was "convinced that wherever people were well educated co-operation would be successful." This charge against the farmers of ignorance did not go beyond the reflection that they failed to inform themselves concerning those beneficial results which could only be attained through the medium of comprehensive co-operation—no union on narrow lines for the aggrandisement of a class or a district, but union founded on a base as wide as this State, and designed to benefit every producer in it.

While with some reason the saying that farmers are slow to move has passed almost into a truism, it would be somewhat unreasonable to expect the man on the land to enter into those business relations implied by active co-operative work with the same readiness as might his brother, whose daily avocations bring him in closer touch with general business than is possible for the agriculturist, whose duties confine him and his family much more to themselves. Moreover, a farmer's relations with many so-called business men not infrequently give him small desire to have any more dealings with them than he can help.

This backwardness is by no means peculiar to this or any other country. Mr. Ernest H. Godfrey, secretary of the Central Chamber of Agriculture, in a letter to the Victorian Chamber, touches on this difficulty as encountered by his association, and the secretary to the Agricultural Organisation Society, in a letter to our Queensland Chamber, under date 7th January last, writes: "Here in England as well as in Ireland and other countries we have to overcome an immense amount of innate suspicion that seems inherent in the farming class the wide world over. The farmers are always imagining you want to 'have them,' to use a slang term. They cannot believe that anyone will try to do them good from purely philanthropic motives."

Plunkett, in his memorandum on agricultural education for Ireland, has gripped one of the primary difficulties when he says, "All educational reform is confronted with this adverse condition, that the supply has to precede the demand. A full understanding of the value of education, and consequently a desire for it, is only given to those who have enjoyed its advantages." If we substitute co-operation for education in the above we have our case in a nut-shell.

Probably few in this room can remember any gathering of agriculturists at which the weakness of a farmer's position, due—in spite of the existing associations—to his comparative isolation, has not been under discussion.

Practical attempts have been made in Queensland to secure a measure of co-operation amongst existing agricultural bodies. One of these, the union of the pastoralists, has been already referred to. The Department of Agriculture, through Conferences such as the one sitting to-day, has demonstrated from an educational standpoint how comprehensive organisation secures wide mutual exchange of ideas, and promotes the extensive dissemination of knowledge.

Our Pastoral and Industrial Association a dozen years ago, for a given object—the success of its annual show—invited representatives from various kindred societies to its council.

At the Bundaberg Conference the Hon. Angus Gibson described the considerable success, not only for their own locality, but for the sugar industry throughout this State, which had resulted from the organisation of some eight or ten district societies under the head of a Council of Agriculture sitting in Bundaberg.

Forerunning the Bundaberg instance, the fruitgrowers of the Southern seaboard districts, some nine years ago, formed the Fruit and Economic Plant Growers' Association in order to link together their common interests.

This association was constituted with a council consisting of representatives chosen from and by the various horticultural societies or analogous bodies already established in the districts mentioned, with an executive selected from such members of this council as were able to meet frequently together.

In its own sphere this particular association has done work of a breadth quite beyond the power of any individual association or district, such as obtaining the appointment of a Government expert, assisting the Department of Agriculture to pass through Parliament the Pests in Plants Bill, and securing the holding of four intercolonial conferences and shows, the whole in the general interest of the fruit industry.

An organisation that would represent and be able to speak, when necessary, as with one voice for the various associations in this State, has long been recognised as most desirable of attainment in the interests of the general agriculturist, and very much has been written and said concerning the lines for adoption.

Some have contended that no organisation of real value to agriculturists could be secured, except in connection with, or working under, the direct auspices of the

Department of Agriculture, forgetting that the advantages in this way obtained would be more than compensated for by the cribbing, cabining, coffining, and confining of what would be otherwise most vital powers for good. In passing, it may be noted that the Central Chamber of Agriculture of Great Britain has proved of most service through being a non-government body.

Others have advocated an organisation having branches created by itself, all working under the same rules, implying the securing of a membership irrespective of or in addition to co-existing societies. While having good points, such an arrangement under present conditions is impracticable. Our agriculturists do not see their way to pay more than one subscription, and desire at any rate to support the society doing some special work in the interest of their particular district. This difficulty has had to be grappled with elsewhere. The English organising society before-mentioned, in carrying out the co-operative principle, found it necessary to adapt the same to the different environments of each county when promoting the incorporation of any society, and therefore lays down no hard and fast rule in the application of agricultural co-operation. In the words of a recent letter from its secretary it "dovetails in with the requirements and idiosyncracies of each village and district."

In Victoria and New South Wales the same difficulty was present, and in each State it was found more advantageous to deal with the established, rather than to attempt the creation of new, bodies.

The more or less nebulous ideas held in Queensland concerning comprehensive union reached a more concrete stage at the last agricultural Conference, when the delegates present, representing about eighty associations, affirmed the advisability of forming a Queensland Chamber of Agriculture, and appointed a provisional committee to undertake thé business.

As convener and chairman of this provisional committee, it has appeared fitting to the writer to bring before the present Conference some particulars of the movement since the Bundaberg gathering of last June.

The committee came at once face to face with the crux of any such organisation—viz.: the all important question which, while it is the strength, is prone to prove the principal element of weakness in any attempt to secure a comprehensive union of agriculturists—viz.: the fact that to do really effective work such a union must include an executive consisting of men able to assemble frequently in some one centre.

There is nothing new in this question; it has been all threshed out and settled long ago from a political standpoint, and more recently in Queensland local governing bodies have found the only means of securing a union in the best interests of each and all was the adoption of similar lines.

Foreseeing that some objection would lie against any organisation having Brisbane as the working centre, in spite of the supreme advantage of securing a continuing executive body constantly alongside the Government and its various departments, as well as the headquarters of the leading carrying companies, &c., the committee seriously considered, but was obliged to abandon any idea of partitioning the State, with the object of securing executives in three or more localities, as rather making against than favouring that community of interests for the whole State which has been so much urged, and is indeed so necessary.

It was further evident that just in the ratio that some body of agriculturists requiring amelioration in their condition might be remote from Brisbane the necessity would only increase for prompt representation at head-quarters. This has been already proved in the working of the organisation that has been formed.

The objections raised to the adoption of any scheme having a single centre lie in the fact that, especially in its initiation, the majority of the representatives on its executive would have to be selected from the ranks of men able to reside more or less close to that centre.

As before indicated, the strength of any organisation of the kind will consist in the fact that it can obtain disinterested men prepared to sit and work on its executive, and give their time and brains at frequent regular as well as at all emergency meetings, and attend on deputations, &c., as required in the interests of brother agriculturists, and to so ensure no matter of business brought under its notice suffering through delay.

Until this matter is thought out country associations and individual agriculturists may consider that some local association only can work in their best interest. If this were so then there seems to be no need for any comprehensive union of agriculturists, and the position goes back to the ancient form of the weakness of a single stick as against the bundle.

After deciding upon the form of the organisation the provisional committee had, *inter alia*, to provide a constitution that should—

(*a*) Prove acceptable to all classes of agriculture whether the same happened to be more or less or not at all locally organised;
(*b*) Give to all sections of the above adequate representation;
(*c*) Secure an equitable and workable mode for electing these representatives;
(*d*) Provide a supreme governing council of direct representatives from all parts of the State with an executive composed of members as widely representative as would be compatible with the attending of frequent meetings;
(*e*) Assure a free hand for speaking and acting irrespective of State or Federal Government influence;
(*f*) Include the means by which sufficient funds might be forthcoming to enable the chamber to do effective work for its supporters, their specific interests, and agriculture generally;

As requested by the Bundaberg Conference, the scheme and rules for organisation when ready in a provisional form were submitted to a meeting of some thirty odd delegates from various agricultural associations which met in Brisbane on 20th September last year. This meeting carried a resolution that a Queensland Chamber of Agriculture be formed, and after considerable discussion adopted the scheme submitted, and with some minor modifications also adopted the rules which had been prepared by the provisional committee.

The committee of delegates further appointed the first office-bearers for the new chamber.

To date, the chamber has during the eight months of its existence succeeded in affiliating with itself some twelve agricultural associations, and has in addition over 100 individual or, as they are termed, "direct members."

Its receipts have been roughly £50, and its outgo £10, including all preliminary costs and the printing of rules and essays read at the meetings.

The executive have held regular monthly meetings for the consideration of all business submitted to it, and various sub-committees have been appointed to carry out special business between the meetings, besides which various deputations have been arranged to the Government departments and carrying companies.

It has watched on behalf of agriculturists in this State the legislation affecting them under discussion in the Federal Parliament, and has made prompt representation in the interests of the agricultural industry whenever necessary. It has kept in touch with and enlisted the co-operation of such of the Queensland members in the Federal Parliament as have been willing to assist.

The Commonwealth Parliament, it is understood, has given consideration to this chamber's representations, and one of the Federal departments, at the chamber's request, promptly removed some unsatisfactory regulations hampering interstate dealing in perishable produce. Various freight and carrying disabilities both in connection with the railways and steamship companies have been tackled, and substantial abatement secured.

Original papers of interest to producers have been read and discussed at the executive meetings, and printed copies of the same sent to members. The president (Hon. A. J. Thynne), at the invitation of the Pastoral and Agricultural Societies' Union of New South Wales, attended a meeting held in Sydney, and the chamber had the satisfaction of finding those interested in this new union in the mother State prepared to alter its constitution in order to come on to the same lines as the Queensland chamber, the Queensland organisation being considered more practical than their own.

The first circular issued by the executive on behalf of the chamber, in addition to making an earnest appeal to existing associations and individual agriculturists for support, pointed out that those most interested—viz., the agriculturists themselves—by identification with the chamber, could soon render it and themselves a power for good in the State; explained that the first executive had been chosen so as to secure regular attendance at the monthly and such special meetings as would have to be summoned to consider urgent business; urged each affiliated association and individual member to take a practical interest in the chamber's working, by submitting any difficulties under which they laboured as well as matters of interest affecting agriculture and the producing interests generally, and strongly emphasised the fact that, to enable the new chamber to hold a similarly effective position to that occupied by the various Australian Chambers of Commerce or Industries, the regular services of an efficient secretary ought to be retained, so that the work of the chamber would go on continuously.

If these jottings assist to bring before Queensland agriculturists the fact that there has been satisfactorily launched an organisation capable of rendering them

valuable assistance, the purpose of the writer will be served. In this connection it may be noted that the chamber's constitution is still open to amendment, such as may be shown to be desirable to enable it to do better work in the interests of its members.

It is believed that less and less objection will be raised against the centralisation necessary for the continuous working of the chamber as agriculturists see the advantages to be gained through this arrangement, and, moreover, recognise that the *personnel* of the executive is largely due to the fact that the outside districts cannot provide representatives able to regularly attend to the day-by-day work of the chamber.

No one understands better than those holding office in such an organisation how much lighter their duties would be could representatives from all over the State sit at the meetings.

As things improve in Queensland and better means of communication are provided, a wider range of representatives will become eligible for the executive, and even now something could be done in this direction if the membership of the chamber increased so as to give a revenue enabling it, at any rate, to refund the travelling expenses of delegates from a distance.

Owing to existing conditions, four out of the twelve office-bearers appointed to the executive for the first year—being the members residing furthest from Brisbane—have had to resign.

Finally, it is to be earnestly hoped that the new chamber will be given the opportunity to bring all the agricultural interests in this State into line.

A German proverb says, "Even weak men when united are powerful."

Now the producers of Queensland are a more numerous and, if organised, would be a more powerful body than they themselves have perhaps any idea of. They are also qualified to take a full hand in many directions in this State which, through the absence of proper cohesion amongst themselves to their daily disadvantage, they are left almost entirely out of.

The way important questions have been decided of late years in Queensland has brought many to see how futile is "arrogant self-reliance," and that the time has come when all who recognise the importance of this question of comprehensive co-operation should become unto their less instructed brothers as apostles preaching the gospel of the religion of mutual helpfulness.

The next contribution was from Mr. Fred. W. Peek, of Loganholme, on—

OUR AGRICULTURAL AND PASTORAL SOCIETIES AND THEIR SHOWS AS AN EDUCATIONAL FACTOR IN QUEENSLAND.

[By F. W PEEK, Loganholme.]

The heading of this paper will no doubt have given rise to the thought in some minds as to what element of success such institutions have been the means of achieving in this State. It is a well-known fact that the primary objects of our societies are to educate the farmers and settlers of this State in the best methods of agriculture, and, by the organisation and holding of exhibitions or shows, to demonstrate by practical object lessons the education and information (to those attending) that it is desirable to impart.

A SOUND BASIS DESIRED FOR SUCH WORK.

It should, therefore, be our aim to see that such institutions, which have such an important object to fulfil, are established on a sound and systematic basis, that the rules and regulations for the carrying out of such a work are perfect in all their parts, and therefore I may be pardoned for bringing this matter forward before this Conference.

The great benefits that have attended the efforts of our agricultural societies have long been recognised. But I would desire to point out that all the methods adopted, and the energy put forth by those enthusiastic workers who have to control and advise, and who, in the past, have expended a vast amount of labour, time, and energy in organising and conducting our agricultural and pastoral shows, and oftentimes gratuitously, would not have been carried out in the true spirit intended if they did not tend to educate, improve the productions, physical conditions, and intellectual status of the people.

The work of agricultural societies is yet in its infancy in Queensland. This State is a long way behind the States of Europe and the mother land in the methods adopted, and in the assistance rendered to agricultural societies and institutions—in that there

are no legislative enactments governing these institutions, each of our societies being permitted to govern itself, to make its own rules and regulations. I have one before me now whilst writing this paper, offering from a local society (four years back) a prize for buckjumping of £5, whilst in the same schedule for the best collection of farm products only £1 is the award, and for the best collection of vegetables 7s. 6d. is set down.

If we desire to make our institutions progressive, and to obtain the fullest amount of benefit from our efforts, we must work in one groove and combine. Each society should be created a branch of a district, and become an affiliated member of one whole council or body representing that district. A representative from that district's council being again represented on the committee of the central institution, that should be recognised as the State society of Queensland for holding the annual show of the various products and resources of the State.

This is what is now the aim of the Queensland National Agricultural and Industrial Association; it is also the aim of the Royal Agricultural Society of New South Wales, and I have received a communication from Victoria stating that the Royal Agricultural Society of Victoria have now decided to add district representatives to their council, and district exhibits to their schedule. There is one great trouble to be met, and it is a serious one to delegates and others attending the meeting of central committees, or executive bodies, and that is—the cost. In some instances it involves a serious outlay of money, besides time lost in travelling to and fro. This is a question that I am sure can be reasonably considered by the Department of Agriculture. The expense of travelling to such conferences repays this State one hundred fold by the knowledge obtained, the dissemination of new ideas, and the keener interest that must be taken by those attending, and to the attention given to the development of our agricultural resources.

A Word to the Farmers and Members.

Our farmers, too, do not seem to grasp the direct benefit to them of becoming members, and giving their best assistance to further the objects of the societies.

If the style or get-up of industrial exhibits, or if the agricultural section is not quite up to standard, as expected, the visitor and farmer should not grumble and belittle the efforts made, but should make up their minds to take a hand in it next time, and by their superior knowledge, experience, education, and facilities help to assist the institution by producing an article in advance of previous exhibits, and creating among the competitors a spirit of emulation that will help forward the good work undertaken of educating, not only our own local people, but the numerous other visitors who attend, say, the annual show in Brisbane, as to the magnificent resources of our State.

The adaptation of our soil and climate to every class of production from the temperate to the tropical zone, offers such an inducement to make a collective exhibit from the various districts if combined, that would be unequalled in the world for its variety and commercial value, comprising such valuable assets of mineral wealth—timbers, wheat, wool, sugar, &c., as staple products—backed up by our ever increasing dairying industry, besides fruits of all kinds and suitable to all climates. All that is required in this State is for our farmers to be educated in the best methods of producing and marketing, and this can be best attained by assisting the work of our local institutions by collecting and exhibiting of our best to the world for judgment. A philosopher (Franklin) once said—"There are three methods of obtaining wealth by a nation—namely, war, commerce, and agriculture"; and he sums up like this—"War is plunder, commerce is generally cheating, agriculture is the only honest way wherein a man receives the real increase of wealth from the seed he sows in the ground." But I ask, of what use is the acquisition of agricultural wealth if, after supplying our own needs, we do not try to cater for the wants of others? The whole world of production indirectly depends upon agriculture. Where would our manufacturing and commercial pursuits be without agriculture?

All the more fitting, then, seeing the dependence of one upon the other, that they should be brought together in close relationship, and I know of no more fitting place than upon our agricultural show grounds. It is here where agriculturalists, pastoralists, planters, mechanics, manufacturers, professional and commerical men all meet and become better known and acquainted with each other, exchange ideas, see the latest inventions of science and skill. the wonderful improvements and methods brought up to date by the people and nations of the world—and all through the agency of the agricultural society, a body of men who very often do not get the recognition they deserve for their energy and public spirit in endeavouring to advance the great producing interests of the nation.

REORGANISATION URGENTLY REQUIRED.

By our agricultural and pastoral shows we advertise to the world the capabilities of our country, and any farmer who neglects to render all the assistance that is posssible in his power, cannot be said to be true to himself and his own interests, his family, or his country. Therefore, I would urge an action being taken first by the Department of Agriculture in establishing a sound basis of working and control, backed up by liberal assistance given in no niggardly fashion, but in such direction that the best efforts and aims of those who are taking an active part in this State's progress may be stimulated in every way possible—by following on the lines laid down and approved by the Department of a uniform and comprehensive nature a practical scheme for which I am prepared to submit.

2. By the renewed energy of our local societies centralising and combining to work together with this object in view, of being the chief educational factor in their respective districts, and ably represented on the council of this State's leading society, by a duly qualified delegate, who knows his district and its urgent requirements, and who will use his best endeavours to see that the productions of his district are brought forward and exhibited in the best manner possible.

3. By the farmers and producers themselves joining and giving every assistance possible to your local committees. If our farmers do not meet together, and by an exchange of ideas and opinions endeavour to provide against such contingencies as the present drought, losses must go on till they spell ruin to themselves, and a serious loss to the State at large.

STATE ASSISTANCE.

Then in view of the importance of organising our farmers in the direction indicated, we must acknowledge that of ourselves we are almost powerless, and in our extremity we look to the Department and the State to further our objects.

If the expenditure of a few thousand pounds annually in the way of subsidy, rightly applied, educates the people, by practical demonstration even in the way of stoving and preserving fodders, which in good and even ordinary seasons grow so prolifically here, or, if the expenditure of State funds helps to educate our people to avert the results of disastrous climatic conditions and influences, by giving instruction in water conservation, irrigation, drainage, &c., which would help to partly advert the serious losses we are now suffering under, I am sure that no reasonable objection can be offered.

It is for those societies who have received subsidies and special grants for certain objects that may have now been achieved, that assistance is no longer required.

It is well known that in the first few years of the existence of a society, assistance is more necessary, because the expenditure and work of organising are sometimes very severely felt. Such work could very reasonably, and should be undertaken by the Department, as is now the case in Canada, where the farmers' clubs and societies are legalised and recognised by the State Government, and assisted in every way possible. The farmers of a district in Canada desiring to form a club or association, have the assistance of an organiser specially appointed for such a purpose by the Canadian Government, who also have authorised a model code of rules laid down for their guidance. A member's ticket is interchangeable between the various clubs or societies. In 1896 there were no less than 509 clubs in operation, with 39,284 members, and these clubs spent for agricultural purposes about £19,702, including £957 for the purchase of thoroughbred animals. The same system is now in vogue in Denmark, and is now introduced into the agricultural system in Ireland. Every assistance is being given by the State to the local society, who send their delegates to the central institution to make known their wants and requirements.

Mr. W. P. COOKSLEY (Brisbane) considered Mr. Corrie's paper a very valuable one. He had no doubt that the fruitgrowers of Queensland were largely indebted to the Fruit and Economic Plant Growers' Association for the remission of harbour dues on all green fruit from Queensland ports. The Chamber of Agriculture had also done much good in obtaining concessions from the steamship companies, which, individually, the fruitgrowers could not have obtained.

Mr. H. A. TARDENT (Dallarnil) discussed Mr. Peek's paper, and said that no district should be without a local society, but that all should work in harmony with the National Association. He would support the movement for the federation of the agricultural societies of Queensland.

Mr. W. R. ROBINSON (Toowoomba) said it was always difficult to get farmers to unite for their own welfare. He hoped farmers would realise the

benefit a Chamber of Agriculture would be to them. He doubted whether the National Association's Show was the premier one of the State, and instanced the work of the Drayton and Toowoomba Agricultural and Horticultural Society in giving a prize for the best thirty lambs, to be frozen and sent to London. That was practical work. He believed in all districts being represented at the National Show.

Mr. A. W. Cameron (Maryborough) did not agree with Mr. Peek's idea of the aims of an agricultural society. The aim should be the education of the people by directing their energies on the land along new and advanced lines, to distribute seeds, find new products, and assist in finding markets for the products when grown. The societies might advise the Minister what lands were suitable for settlement in their particular districts. As to rules, each society framed rules best suited to the district. With regard to prizes for buckjumper riding, these were not given by any society; it was usually the gift of private individuals.

Mr. A. McShane (Toowoomba) said that the farmers got a great deal of assistance from the Agricultural Department, and so did the societies. He did not agree with Mr. Peek's objection to prizes for buckjumper riding at shows. He thought that a good prize should be given to young judges. Let the young fellows make awards, and let an expert judge afterwards examine into these awards and their reasons for them, and give the prize to the young fellow showing most judgment. Good judges were getting scarce, and it would be a good plan to train young men to become expert judges.

Mr. J. McPherson (Rockhampton) complained that no opportunity was given to Northern men to be represented on the executive of the Chamber of Agriculture even in the concession of a railway fare. Men could not be expected to go from Rockhampton to Brisbane to attend meetings and pay their own fare and expenses. He did not see why the Northern societies should not be granted the same facilities for making their shows a success as are granted to the National Association.

Mr. J. L. Bowman (Boonah) agreed with Mr. Peek that buckjumping was not a desirable feature at a show.

Mr. W. J. Affleck quite agreed with the training of judges, and thought a young man should always accompany a judge, and be informed of the reasons for the awards made.

The Hon. A. J. Thynne spoke at length on the subject of the Chamber of Agriculture, of which he was president. He also discussed the subject of the organisation of district societies, the "manufacture" of judges, and thought that no better suggestion had been made at that Conference.

Mr. W. Atkinson (Danderoo) spoke in support of the Chamber of Agriculture.

Mr. John Reid (Brisbane) said he thought most of the speakers had missed the point on which Mr. Peek's paper hung. His impression was that Mr. Peek intended to suggest that existing societies should remain as they are, but that they should work in unison in their respective districts, and that each should become associated with the main society in Brisbane for the purpose of the district exhibits. He explained how this could be done, and paid a tribute to the excellent work done by the National Association.

Mr. W. G. Winnett (Logan) thought every society in the State should be affiliated with the Chamber of Agriculture. He did not believe in district societies having small branches.

Mr. J. W. Lee (Zillmere) agreed with the last speaker as to affiliation with the Chamber of Agriculture, and expressed himself in favour of training judges.

Mr. R. Sumner (Zillmere) spoke to the same effect at considerable length.

Mr. W. Miscamble (Roma) was there to support anything that was done or said at the Conference in favour of the Chamber of Agriculture. He was glad to know that it was taking into consideration the question of outward wharfage charges, and was trying to induce the Railway Department to

guarantee the weight of the wheat put on trucks at various railway stations. The weights at the farmer's end and those at the other end of the railway nearly always disagreed, generally to the disadvantage of the farmer.

Mr. D. WHITELY (Rockhampton) said there was a weighbridge on the Emu Park line which always went 18 cwt. to the ton.

Mr. L. G. CORRIE spoke on Mr. Peek's paper to the same effect as did Mr. Reid. He advocated single judging. Mr. Peek advocated getting special help from the Government, but the Chamber of Agriculture did not want Government help, in fact, it wanted to stand clear from the Government. It wanted to make the Government do things that the Chamber might consider to the interests of the farmers.

Mr. PEEK (Logauholme) explained his system of working in the interests of the agriculturists of Queensland and his work in connection with the National Association. He deplored the ignorance displayed by Southern legislators sent from here who do not know either our requirements or our resources.

Mr. McLEAN (Agricultural Department) informed Mr. Peek that Victoria had already taken up the question of interstate exhibits at the annual show of the Royal Agricultural Society in Melbourne.

The session was concluded by a very able and thoughtful address by Mr. J. C. NEILSEN, of Laidley, on country agricultural societies, the chief points touched on by the speaker being their organisation and operations, their attitude towards each other and to the central or town societies—*i.e.*, agricultural societies having their headquarters at Townsville, Rockhampton, Toowoomba, Ipswich, and Brisbane—the possible affiliation, in groups, around the above centres, the development and management of district society competitions and interstate collections, &c. Mr. Neilsen's remarks necessarily traversed much of the ground contained in the papers of Messrs. Corrie and Peek, but we regret that the inexorable exigencies of space preclude us from quoting them at length.

SEVENTH SESSION.

THURSDAY, 12TH JUNE, 1902. 9·30 A.M.

AGRICULTURAL MACHINERY AND IMPLEMENTS.

[By Mr. W. D. LAMB, Yangan.]

In selecting this subject for my papers at this Conference, I feel that I am touching on a matter that has been too much overlooked in the past. One has only to take a drive over the agricultural districts on the Downs especially, and, if he knows anything about machinery, he will see sights that must make the heart of the machine agent rejoice. It is no uncommon sight to see valuable machinery of almost every description lying about the paddocks just where they finished the last harvest, and there they will lie until the next harvest. I maintain that in no other country do machinery and implements cost the farmer more money and are so little cared for. Three-fourths of the machinery that our farmers buy are never worn out. They are simply neglected and allowed to rust out. It is a very easy matter for any farmer to erect a shed to shelter his machinery and implements when not in use. A few posts and a few sheets of iron or roofing felt, and a few hours' work, and the thing is done. If the careless farmer would make a practice of putting all his machinery, &c., under cover directly he finishes the work that he has on hand, in a few months' time, I venture to say, that he would be surprised when he took it out to work the next time. And what a saving of time and temper there would be in having his machines and implements in one place where he could lay his hands on any article when it was wanted, instead of having to hunt all over the farm for it! What a humiliating sight it is to see a farmer in this progressive age wrestling with a neglected binder or mower, with a bottle of kerosene in one hand and a screw-wrench in the other, trying to get his machine to move! Of course that man is well-known to the machine agent, who is very shortly on the job, and the result is, a lot of new duplicate parts or a new machine, for which the farmer will have to pay. If our farmers would only pay a little more attention to all the little details and small leakages on their farms, what a saving there would be

in only one year. Keep your machines under cover when not in use. Keep them ready for work at any time. Use them intelligently, and you will be amply repaid by being able to do your work well, and to do it when it ought to be done. I trust that the time is not far distant when we shall take more kindly to Australian-made implements and machines than we have in the past. One has only to look over the list of Australian farm implements and machines to be convinced that the inventive genius is with us here. I understand that the stripper, the complete harvester, the disc and stump jump ploughs, disc harrows, travelling chaffcutters, and other implements which have revolutionised agriculture in Australia, are Australian implements. I think that our farmers should not be too eager to purchase new imported implements on testimonials of what they have accomplished in other countries. Agricultural conditions differ so much that we cannot trust solely to experience elsewhere, "and do the sum to prove it" before swallowing the whole of what we read and are told by interested agents. All new machines should be advertised in newspapers circulating in the district, if only as a guarantee of the *bona fides* of the manufacturers. If there is anything wrong about a machine, such publicity would be sure to bring information regarding it from elsewhere. Also I am of opinion that our State farms should take more trouble in proving the worth of new machines and publishing the results. It is as essential to know the right sort of tools as it is to know the right sort of seed. I would say, in conclusion, from my experience of English, American, and Australasian machines and implements, that I maintain, that as far as Australia has gone in the agricultural manufacturing business, she is able to hold her own, and I trust that the time is not far distant when Australian machines and implements will be used on every farm in this great country. I would like it to go forth from all the farmers of this State that we have a patriotic desire to encourage the manufacture of such machinery and implements within our own and other States, where the manufacture of such machinery employs so many artisans. We should receive such reciprocal support as would nullify any attempt to prejudice the primal producers of wealth from the soil as that contained in the proposal to remove the grain and fodder duties.

Mr. W. N. Atkinson (Danderoo): Before I commenced farming I was a coachbuilder, and I know the coachbuilder's best friend is the man who never paints his conveyances. Every machine on a farm needs a coat of paint every year, and after all it is very unsatisfactory for machine agents to see their machines getting ruined on a farm for the want of a little bit of paint. This work should occupy every farmer's attention during the slack season; and, moreover, whenever a machine is stored for the season it should be put away in thorough order and repair.

Mr. H. A. Tardent (Dallarnil): There is a great deal in this machinery question, and it is going to help us financially. Cane-cutting machines are being invented, and shortly the work in the canefields will be carried out by Australian white men using improved machinery. I thoroughly endorse Mr. Lamb's advice that new machinery should be tested on the State farms, for the show-ground is not the proper place for trying them, either for the grower or the agent. In maize-growing we are still in a barbarous stage. There are two machines alone, the harvester—which is to maize what the reaper and binder is to wheat—and the shredder, that if introduced and adopted here would revolutionise our system of the cultivation and use of the maize plant.

Mr. A. H. McShane (Toowoomba): Mr. Lamb had a good word to say for Australian-made machines. I am strongly in favour of local production, but there is one great fault in colonial-made implements and appliances, and that is there is too much iron and not enough steel in them. The result is they are too heavy, and the workmen waste a lot of enegy in hauling about a lot of iron where half would do. Most of the colonial machinery is made of flat iron, but if its manufacturers would go in for the use of tubular steel or angle-iron instead, they would find that their machinery would be much more in favour with agriculturists.

Mr. W. D. Lamb (Yangan): I thank you for the appreciative manner in which you received my paper, and trust it will be the means of leading to some good, both in the use of implements on the farm, and also in their manufacture. I certainly think that we can, and will, produce as good machinery here as in

any part of the world, and as well made, as cheap and as light. We ought to know more about the machines on our farms, however, and my advice is to get the mastery of every piece of machinery that comes on to your farm and to learn to use it. Go to some trouble to understand the working of the machine yourself, and then if you get a raw recruit on the farm you can teach him how to use it; and I venture to say that you will get better work out of that raw recruit than out of many so-called experts that you would otherwise have to employ, the more so because you would probably be able to trust the pupil you had trained yourself.

Mr. V. C. REDWOOD (Toowoomba) endorsed the remarks made by Mr. Lamb on the necessity of greater attention being paid by Queensland farmers to the care of their machinery, and also laid stress on the desirability of farmers acquiring a thorough knowledge of the use and working parts of every machine they buy.

(To be concluded.)

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1901.								1902.				
	May.	June.	July.	Aug.	Sept.	Oc	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.
North.													
Bowen	0·94	0·19	0·10	6·36	0·18	0·93	0·92	0·71	0·19	2·19	2·01	0·68	Nil.
Cairns	13·18	0·57	0·89	2·53	1·82	2·34	5·23	2·78	3·79	12·90	11·43	3·48	2·34
Geraldton	26·72	1·21	2·58	11·77	3·37	3·85	6·45	1·60	3·78	16·87	7·55	12·83	5·39
Herberton	3·80	0·18	0·64	2·53	1·04	4·92	1·13	1·30	0·57	5·77	3·86	1·54	1·07
Hughenden	3·48	0·03	Nil.	0·33	Nil.	0·31	0·29	1·43	1·57	2·02	0·53	*	Nil.
Kamerunga	13·18	2·09	2·60	1·94	1·72	1·19	5·74	2·16	2·58	10·59	14·24	3·40	2·63
Longreach	5·95	0·09	Nil.	0·37	0·58	Nil.	Nil.	1·71	0·87	0·27	0·18	0·03	0·03
Lucinda	8·63	2·89	2·17	5·89	0·30	2·59	Nil.	0·32	3·55	11·38	2·67	1·78	*
Mackay	1·32	0·25	1·07	5·14	2·29	1·35	1·85	0·71	3·78	8·43	4·41	6·73	1·26
Rockhampton	0·79	0·24	2·29	3·04	1·78	0·51	0·41	0·19	4·79	1·36	1·68	0·21	Nil.
Townsville	0·74	0·32	0·19	1·87	0·14	0·90	0·16	0·61	2·24	3·14	1·61	0·35	0·04
South.													
Barcaldine	2·21	0·82	0·63	0·25	0·51	0·54	0·55	0·09	2·39	0·07	0·37	0·02	Nil.
Beenleigh	4·55	4·15	1·34	4·49	0·70	3·35	1·35	0·14	2·41	1·82	0·68	0·42	Nil.
Biggenden	1·47	1·56	0·74	2·81	2·11	1·35	0·47	0·92	2·12	0·83	1·80	0·65	Nil.
Blackall	3·80	0·90	0·55	0·44	0·88	0·60	0·97	0·32	1·68	0·34	0·34	0·05	Nil.
Brisbane	2·29	3·29	1·31	3·71	1·30	3·25	1·41	0·75	1·38	2·67	0·76	0·17	0·47
Bundaberg	1·14	0·74	2·01	5·59	1·80	2·18	1·28	Nil.	6·33	0·75	1·99	0·43	0·02
Caboolture	3·34	2·27	3·70	3·18	1·55	5·01	3·17	3·45	2·29	2·66	1·29	1·99	Nil.
Charleville	3·28	0·93	1·27	0·92	0·32	0·04	0·65	0·96	0·47	0·22	0·42	0·23	Nil.
Dalby	1·12	3·59	2·83	1·66	1·11	4·09	0·15	0·42	1·65	0·20	0·30	2·00	Nil.
Emerald	1·31	0·63	0·90	1·74	1·11	Nil.	0·09	0·63	3·28	1·11	0 97	0·30	Nil.
Esk	1·78	2·45	3·01	3·03	1·72	4·67	1·08	2·20	1·81	1·06	0·75	1·25	Nil.
Gatton College ...	1·55	2·93	1·53	3·23	1·06	3·02	0·86	0·26	2·27	1·58	0·26	*	0·04
Gayndah	0·97	2·32	2·29	Nil.	1·91	2·39	0·04	0·38	2·54	0·51	0·99	0·81	0·29
Gindie	1·21	0·84	1·34	1·77	1·81	0·53	0·02	0·57	1·35	1·46	0·78	0·47	Nil.
Goondiwindi	1·90	1·73	2·30	1·55	0·67	2·83	0·21	0·20	2·06	0·75	1·20	0·06	0·02
Gympie	3·38	2·82	3·40	3·39	1·34	1·91	1·34	1·25	1·49	1·65	2·33	1·09	0·23
Ipswich	1·43	3·16	0·97	2·47	3·54	3·98	1·17	0·35	1·45	2·80	0·32	0·03	0·02
Laidley	1·47	2·54	2·00	5·32	1·22	3·37	1·10	1·65	1·79	1·94	0·39	0·10	0·20
Maryborough	4·09	2·22	3·07	5·02	1·05	1·54	1·84	1·54	1·29	0·75	0·96	1·57	0·36
Nambour	7·25	3·33	6·80	4·42	0·98	3·89	2·85	3·89	1·30	2·06	1·61	†	0·26
Nerang	5·42	5·34	0·79	5·41	0·88	4·57	2·70	0·46	3·98	4·54	0·65	0·65	0·35
Roma	1·11	2·66	2·26	0·98	0·43	0·71	0·54	0·83	2·72	1·11	0·54	0·15	Nil.
Stanthorpe	0·77	2·74	1·52	4·22	1·42	2·93	2·22	1·67	3·17	0·51	0·56	0·10	0·87
Tambo	2·85	1·47	0·73	0·74	1·47	0·51	Nil.	0·16	1·73	0·35	0·68	0·04	Nil.
Taroom	1·70	2·19	2·74	2·34	2·11	0·92	0·42	0·31	0·53	1·82	1·30	0·33	Nil.
Tewantin	12·20	5·45	8·34	4·61	2·71	3·26	1·66	2·70	3·09	1·13	3·44	2·84	0·80
Texas	1·10	1·87	1·00	3·06	1·47	1·47	0·26	0·43	1·95	1·62	0·42	Nil.	Nil.
Toowoomba	1·04	3·57	2·22	5·57	1·85	4·45	1·10	0·87	3·46	1·20	Nil.	0·79	0·03
Warwick	0·82	3·47	1·57	5·74	2·05	3·12	1·19	0·71	3·48	0·65	0·55	Nil.	0·15
Westbrook	0·74	3·48	1·64	6·50	1·75	2·27	0·59	0·31	3·21	1·04	0·06	0·41	Nil.

* Returns not yet received. † Data unreliable.

CLEMENT L. WRAGGE,
Government Meteorologist.

General Notes.

SHOWS DURING THE MONTH OF AUGUST.

Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association—6th and 7th August.

Proserpine Farmers and Settlers' Association—1st and 2nd August.

Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society—7th August.

Bowen Pastoral, Agricultural, and Mining Association. Hon. secretary: Fred. H. Myles—21st August.

Royal Agricultural Society of Queensland, Toowoomba—5th, 6th, 7th, and 8th August.

The Biggenden Agricultural and Pastoral Society will hold no show this year, owing to the drought.

National Agricultural and Industrial Association of Queensland, Brisbane—12th, 13th, 14th, and 15th August.

The annual show of the Dalby Pastoral and Agricultural Society will not be held during this year. Mr. J. D. Ramsay has been appointed hon. secretary, *vice* Mr. W. M. Alexander, resigned.

NEW SOCIETY.

The Childers Pastoral, Agricultural, and Industrial Society. Hon. secretary: Richard Beiers.

Answers to Correspondents.

CASTOR OIL.

A. HANNAM, Cairns—

Question 1.—I have a few acres of castor oil trees planted as an experiment. I would like to know an easy way of extracting the oil without going to the expense of costly machinery?

Answer 1.—Process described in the June issue of the *Journal*.

Question 2.—What price per gallon would the oil bring in the Commonwealth?

Answer 2.—2s. 9d. per gallon. Buyers would probably prefer to pay 3s. to local manufacturers, as the loss by leakage in tins from Europe is very considerable. The quotation is for lubricating oil—not medicinal.

Question 3.—How many gallons of oil should the crop yield per acre?

Answer 3.—The average return of beans is from 15 to 25 bushels per acre, according to soil and cultivation; 40 per cent. of oil should be extracted from the beans.

CONTENT OF A DAM.

JOHN EMMERSON, Crow's Nest—

Question.—How many cubic feet of earth have been removed from a dam of the following dimensions: Top—1 chain square; bottom—½-chain square; depth—6 feet. How many cubic feet are there in it, and how many gallons of water will it hold?

Answer.—The dam contains 564⅔ cubic yards or 15,246 cubic feet, and will hold 95,022·77 gallons.

EXPORTS OF MEAT FROM QUEENSLAND.

GRAZIER, Roma—

Question.—Can you give me some idea of the quantities of beef and mutton exported annually from Queensland to England and other markets?

Answer.—The totals for the year 1901 were: Beef, 461,425 quarters; mutton, 26,864 carcasses; lambs, 6,247 carcasses.

During 1902 the figures to the end of March were: Beef, 111,467 quarters; mutton, 15,640 carcasses; lamb, 400 carcasses. Most of this went to the London market, and a large quantity to South Africa. We cannot give you details.

A CURE FOR BLACKLEG.

J. D., Loganlea—

Question.—Can you tell me what will prevent blackleg in calves?

Answer.—A remedy comes to us from Mrs. F. J. Nock, Murray's Creek, North Coast line. Our correspondent says she has never known it to fail if done once or twice a year in bad seasons for the disease, when every calf should be operated on. Take a root or two of garlic, put them in a pickle bottle and cover over with spirits of turpentine. Let them soak for thirty-six hours. Then soak some strong wool or worsted in the mixture, and get a packing needle. Thread it with the wool and draw it through the dewlap of the calf. Tie it in a knot, as the calves often lick it out. Blackleg will then not appear.

ANOTHER REMEDY.

Mr. T. E. Betts, Glastonbury, says:—Cut a good-sized hole in the brisket of the calf, and draw through it a piece of moleskin to act as a seton. Tie the moleskin loosely and let the animal go. This simple process has been employed here for the last twenty-five years, and I have never seen a calf die of blackleg after the treatment.

The Markets.

AVERAGE TOP PRICES FOR MAY.

Article.		MAY. Top Prices. £ s. d.
Bacon	lb.	0 0 8
Bran	ton	7 10 0
Butter, First	lb.	0 1 4½
Butter, Second	,,	0 1 2
Chaff, Mixed	ton	6 2 6
Chaff, Oaten	,,	5 15 0
Chaff, Lucerne	,,	10 0 0
Chaff, Wheaten	,,	5 1 3
Cheese	lb.	0 0 9
Flour	ton	10 10 0
Hay, Oaten	,,	6 0 0
Hay, Lucerne	,,	9 12 6
Honey	lb.	0 0 2½
Rice, Japan (Bond)	ton	15 0 0
Maize	bush.	0 4 9¼
Oats	,,	0 4 0
Pollard	ton	7 17 1½
Potatoes	,,	7 0 0
Potatoes, Sweet	,,	6 5 0
Pumpkins	,,	6 2 6
Sugar, White	,,	20 15 0
Sugar, Yellow	,,	18 10 0
Sugar, Ration	,,	15 0 0
Wheat	bush.	0 4 6¼
Onions	cwt.	0 9 4½
Hams	lb.	0 0 11
Eggs	doz.	0 1 9¼
Fowls	pair	0 3 4¼
Geese	,,	0 4 5
Ducks, English	,,	0 2 6¾
Ducks, Muscovy	,,	0 3 5¼
Turkeys, Hens	,,	0 6 3
Turkeys, Gobblers	,,	0 12 4½

ENOGGERA SALES.

Article.	MAY. Top Prices. £ s. d.
Bullocks	9 7 6
Cows	7 12 6
Wethers, Merino	0 15 7½
Ewes, Merino	0 12 9¾
Wethers, C.B.	0 14 6
Ewes, C.B.	0 12 3¾
Lambs	0 10 7½
Baconers	2 5 3
Porkers	1 12 7½
Slips	0 10 3

Orchard Notes for July.

By ALBERT H. BENSON.

The remarks that have appeared in the Orchard Notes for the last three months anent the handling, packing, and marketing of citrus fruits apply equally to the present month.

The pruning of all kinds of deciduous fruit trees should be completed during the month. All prunings should be gathered and burnt, and the tree should then receive a thorough spraying with the lime, sulphur, and salt wash, which is the best all-round winter spray, acting both as an insecticide and a fungicide. After pruning and spraying, the orchard should be well ploughed, so as to bury all weeds and trash that may have accumulated, to sweeten the soil, and to break up any pan that may have been formed by summer cultivation.

Cirtrus trees, from which the fruit has been gathered, should be pruned now, the pruning to consist of cutting out all dead branches or branches having borers in them, as well as all branches, thorns, or twigs growing in the centre of the tree which are not required. The centre of the tree must be kept well opened up, as, unless this is done, the superfluous wood only forms a harbour for all kinds of insect and fungus pests, and, in addition to this, where the tree is not well pruned out in the centre, it is impossible to do good work with the spray pump.

As already stated, all the prunings from the tree should be gathered and burnt, as this is the surest way of destroying any scale insects, borers, or fungus pests with which they may be infested. If you have no spray pump, then the above mixture should be applied with a brush. It will destroy all scale insects with which it comes in contact, and will remove all moss and lichen as well as stop the spread of canker or bark rot.

The planting of deciduous trees can be continued throughout the month, but it is not advisable to delay it more than can be helped, as when the trees are planted, even though they make no leaf or wood growth, they begin to threw out adventitious rootlets which are ready to start work as soon as the first top growth takes place. Don't plant too deep: the depth at which the young trees stood in the nursery is the right depth; trim the roots carefully so as to remove all bruised portions; spread the roots out well, so that they may get a good hold of the ground, and always spread a little fine top soil round them, as this will be conducive to the rapid formation of new roots.

Cut back hard at planting, and don't be afraid that you will spoil your tree by doing so. Failure to cut hard back prevents the formation of a strong, well-grown, symmetrical tree, and always tends to injure the future vigour and growth of the tree.

See that all trees that are planted, whether deciduous or evergreen, are free from pests, as it is much easier to keep disease out of the orchard by planting clean trees than it is to stamp out disease once it has got a fair hold. Where the trees are infested with scale insects of any kind, they should be treated by hydrocyanic acid gas, as recommended and described from time to time in this *Journal.* If this treatment of the young trees is carefully carried out, there is every chance of their remaining clean for a considerable time after they are planted.

Do not plant rubbish; only plant those trees that your soil and climate are adapted for. Do not try to grow fruits that will only end in failure, as no grower who is dependent on fruit culture for his living can afford to grow fruits that can be produced both better and cheaper by others under more suitable conditions; but he must confine his energies to the culture of those fruits that prove a commercial success.

It costs just as much to prepare the land for and to plant, prune, spray, manure, cyanide, and generally look after an inferior variety of fruit tree, or a variety of fruit tree that is unsuitable to the climate, and from which no return of any value can ever be obtained, as it does to grow a variety that is

suitable to the soil and climate, that will produce superior fruit, and for which there is always a ready sale. Therefore, I again repeat that no grower who is dependent on fruit culture for his living can afford to spend time or money in the growing and looking after unsuitable varieties of fruit trees.

Farm and Garden Notes for August.

This and the following two months are about the busiest periods of the year so far as work in the field is concerned; and the more activity now displayed in getting in the summer crops, the richer will be the reward at harvest time. Potatoes should be planted, taking care to select only good sound seed that has sprouted. This will ensure an even crop. Yams, arrowroot, ginger, and sugar-cane may now be planted. Sow maize for an early crop, choosing the largest and flattest grains. If the seed of prolific varieties is regularly saved, in the end it will not be surprising to find from four to six cobs on each stalk. This has been the experience in America, where the selecting of seeds has been reduced to a fine art. Swede turnips, clover, and lucerne may be sown, but as the weeds will soon dispute the ground with the crops keep the hoe and cultivator constantly going. Sow tobacco. Rice and coffee (except Liberian) should be by this time harvested. August is usually a dry month, especially in the North, but the probabilities are that the drought will have broken up by that time, and heavy rains may be looked for. As was the case after the great drought of 1864, the ants are now everywhere taking to the trees, and the aboriginals are making their camps on high ground in anticipation of floods. Plough out the old canes, and get the land in order for replanting.

Kitchen Garden.—Nearly all spring and summer crops can now be planted. Here is a list of seeds and roots to be sown which will keep the market gardeners busy for some time: Carrots, parsnip, turnip, beet, lettuce, endive, salsify, radish, rhubarb, asparagus, Jerusalem artichoke, French beans, runner beans of all kinds, peas, parsley, tomato, egg-plant, sea-kale, cucumber, melon, pumpkin, globe artichokes. Set out any cabbage plants and kohl-rabi that are ready. Towards the end of the month plant out tomatoes, melons, cucumbers, &c., which have been raised under cover. Support peas by sticks or wire-netting. Pinch off the tops of broad beans as they come into flower to make the beans set. Plough or dig up old cauliflower and cabbage beds, and let them lie in the rough for a month before replanting, so that the soil may get the benefit of the sun and air.. Top dressing, where vegetables have been planted out, with fine stable manure has a most beneficial effect on their growth, as it furnishes a mulch as well as supplies of plant food.

Flower Garden.—All the roses should have been pruned some time ago, but do not forget to look over them occasionally, and encourage them in the way they should go by rubbing off any shoots which tend to grow towards the centre. Where there is a fine young shoot growing in the right direction, cut off the old parent branch which it will replace. If this work is done gradually it will save a great deal of hacking and sawing when next pruning season arrives. Trim and repair the lawns. Plant out antirrhinums (snapdragon), pansies, hollyhocks, verbenas, petunias, &c. Sow zinnias, amaranthus, balsam, chrysanthemum, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins; and plant gladiolus, tuberoses, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. In the case of dahlias, however, it will be better to place them in some warm moist spot, where they will start gently and be ready to plant out in a month or two. Although we anticipate that the drought will be over in August, it must be remembered that this is the driest of our months. During thirty-eight years the average number of rainy days in August was seven, and the mean average rainfall 2·63 inches, and for September 2·07 inches, increasing gradually to a rainfall of 7·69 inches in February.

IMPORTANT NOTICE.

As several remittances in coin have been forwarded to the Department in payment of twelve months' postage of the *Journal* without registration of the letters containing such coin, the Postal Authorities have charged THREEPENCE for registration. It is, therefore, requested that those who have failed to register their letters will remit the amount named, otherwise the *Journal* will only be forwarded for nine months from 1st July.

Agricultural Conference.

At Toowoomba, 9th, 10th, 11th, and 12th June, 1902.

SEVENTH SESSION—*continued.*

Mr. J. J. Daniel, of Pittsworth, then read the following paper on—

STORAGE OF FOOD FOR STOCK.

However much many depend on the governing bodies or their neighbours for their supply of water, few try to put the responsibility on others for the supply of food for their stock, whether that supply is green or stored. We look to Nature for the weather suitable to grow, then to our own judgment to use or store. Whatever may have been past experience in the way of obtaining food for storage from Nature's own untilled pasture, with here and there a few exceptions, we have for some time concluded that if we need such it must be obtained through cultivated and sown land; hence our attention has been given to the cultivation and sowing of our land. To do this as efficiently and cheaply as possible, we have been importing and manufacturing implements, such as ploughs and cultivators, which enable us to cover large areas in little time, so that now, in this respect, we are well up to date. Then a good deal has been done and said in regard to the best kind of seed to be sown to give the best all-round return, and we think the lucerne plant for a drought-resisting and continuous cropper has come out on the top, with oats and wheat for heavy yields to provide stacks for time of need. We have not neglected machinery for sowing or gathering in the crops; we are well to the fore with drills, broadcast seed-sowers, reapers and binders, mowing machines, and rakes. These have not been white elephants in our State, for large areas have been broken up, cultivated, and sown; our fields have been white or ripe unto harvest, but those who have harvested have been few. With every appliance at hand for growing, gathering, and storing food, when we take into consideration the large areas of natural grass destroyed, the increased number of our stock requiring food to be stored for winter or for work, to say nothing of times of drought, are we in a much better position to meet such a time as we are now passing through than we were twenty years ago? Certain it is there is more suffering and loss in our stock, and much more worry, anxiety, and loss to ourselves. And why? Not because we have not had food, but because we have not stored it. A few years ago it was thought that if a man had 100 acres of lucerne, and grew 50 acres of wheat, there was little danger of his ever wanting food for his stock. These areas have been largely exceeded. Lucerne has grown well, wheat and oats have grown luxuriantly, yet to-day many are found with starving sheep, frames of cattle, and horses with poverty and want well defined; and many more would be in this state, but they have bought back the food they sold, some of it as low as 5s. per ton, at the advanced price of £5—for on all their broad acres you see not a stack. In days gone by, stacks of lucerne, wheaten hay, and straw were to be seen on almost every farm, but they have disappeared. Why? Men have found a cheaper and quicker way of taking off their crops. Sheep and big stock feed it off, and store their own. This is right enough if provision has been made for the time when there is none to feed off, for the stock's own storage only lasts a few hours. This is not wholly accounted for by the saying it is want of forethought, for it is there, and a farmer is often heard to say, it is better to have the 1s. now than the 6d. or 1s. 6d. in the future. It is largely accounted for by the greed that men have to get money, to get it quickly and in the easiest way without having due regard for the future. "The love of money is the root of evil"; it is the root of the tree that is bearing the most destructive fruit as regards our stock. That is, that so little provision has been made to feed them. It is also accounted for by the state in which the labour market was found at harvesting time, also by the few good winters we have had, for they have thrown us off our guard. We have said: There will be plenty, so we will not store. In the first part of this season there was food enough grown on the Downs, not only to have fed the Downs stock, but to have kept a fair supply on our market, but it was fed when not wanted, it has been wasted in paddocks in heaps, burnt, and trampled under foot. Our wheat-growers are very little better off than our lucerne-growers. Some of them to-day are blaming the strippers and harvesters for this, but it is not the machines,

but the men who use them. These machines are grain gatherers, labour savers, to the producer, but they in no way interfere with the storage of food. By cutting a certain area with the binder just as the grain is well formed and stacking it ready for the chaff-cutter, we have a very good and economical way of feeding the working stock, or if this seems too expensive then let the binder follow the stripper and bind up the straw, even if it has to be left in the paddock till the grain is gathered in. But many who used the reaper and binder are little better off, having wasted the chaff and let the stock trample down the heaps of straw. This waste of fodder not only applies to our farmers, but to many of our large Western graziers, who often tell us of the wondrous growth of grass they have, and who could, without robbing the stock of their pasture, make stores for time of need. We think it would improve the pasture. The seven years of plenty should provide for the seven of famine. But our motto is: Easy come, easy go; and our harvest to-day is perishing stock, distracted men, and overdrawn bank accounts. We do not store, but we overstock, and we oversell that which we produce, scarcely keeping enough grain to sow our land and none for the stock. Many are learning a lesson, very dearly bought by the misery and poverty of their stock, and by the downfall and ruination of their once bright hopes and prospects, for many an enterprising man is thus stranded. We must learn that if we keep fowls, pigs, horses, cattle, or sheep, we must provide for them by storage. Our sheep industry in all its branches will suffer severely. Our lately developed and profitable dairying industry will be wellnigh shaken to pieces, and this should be a lasting lesson to those engaged in it. Cows will not milk without food and water, and the better the food the greater the return. On these two lines, storage of water and food, will be found the most regular and successful way to occupy our land. It will not prevent drought, but it will prepare us to meet it so as to minimise suffering and loss. "Waste not, want not." If, in this rich land of ours, we practised the first, the latter would not be our bitter experience.

Mr. Daniel also read a second paper on "Practical Thoughts from the Drought of 1902," which we regret we cannot print in this issue owing to want of space. The paper dealt principally with the question of water storage by means of wells in preference to dams, by collecting water from the roof of railway stations, churches, and public buildings generally, both by private and public effort.

The next paper read was—

PRICKLY PEAR AS FOOD FOR DAIRY STOCK.

[By John Germain, Ipswich.]

Shakespeare tells us that "Misery acquaints a man with strange bedfellows." This is undoubtedly true in a figurative sense, and it is equally true literally that droughts and adverse seasons acquaint stock in Queensland with a variety of food-stuffs of which they would otherwise know little or nothing. In the earlier stages of scrub farming, I have seen cattle, when turned into the clearings after the crops had been harvested, strip the dry leaves and their footstalks from the old maize stems, and as the winter progressed they would return for the once-rejected dry stalks themselves, till there would be absolutely nothing left for the farmer to burn off when preparing the land for the next crop. Later on the poor cows might be seen around the hut-like barn, chewing the cores of the maize cobs as they sometimes do bones. At the present time (9th May), both cattle and horses may frequently be seen in the rivers and creeks feeding on water-grass and other aquatic vegetation not usually esteemed by them, while disagreeable and noxious weeds—Noogoora burr, for example—are browsed in order to stay the pangs of hunger. It is now many years since I first noticed, here and there, an old cow treating herself to a winter feed of prickly pear, which, by the way, is fairly well distributed over many parts of West Moreton. The animals did not seem to feed indiscriminately over the patch, but to make an opening in a clump and keep to that spot for a considerable time, gnawing away at the very thick old stems, from which, perhaps, they could obtain the maximum of food with the minimum of prickles.

Though the use of this cactus for fodder is not new in the neighbourhood of Ipswich, it has never before come into such prominence; but then it must be remembered that we have had no rain worth speaking of since last October—certainly not enough, unless in very specially-favoured localities, to ensure the production of a cultivated crop of any kind. The object of this paper is not an apology for a noxious weed, but simply to show to what profitable use it may be put under certain conditions.

We should endeavour to go through life with our eyes open, and not to allow self-opinion or bias—modified forms, often, of bigotry or intolerance—to unduly influence us. Were it not for this, my attitude towards the plant under notice would be that of direct and uncompromising antagonism; but, then, how often does time show that the folly of to-day is the wisdom of to-morrow? And who knows but we may yet come to consider it a good thing rather than an evil—say, as a sheep in wolf's clothing? I think it a pity, however, to allow such a plant to overrun the land and elbow out the natural pasturage. Moreover, good land may be made to produce much better and more useful fodder. Of course it is claimed, on its behalf, that it is only a *dernier ressort*—a last resource, a stand-by in time of scarcity—the careless or improvident man's resource, some may say—and so, perhaps, in the interest of the small cow-keeper about town, we may tolerate its growth on by-roads and waste lands. The trouble incidental to its preparation will militate against its use generally, and the man who has an ample supply of hay or other fodder on hand is not likely to trouble with it. I am well aware that it is little use to tell the man who has not this supply that he ought to have it; also that it is far easier to write about what should be done than to do it. Still, I do think that these bad seasons certainly show the necessity for the dairy farmer of limited acres making better provision, in the way of hay, silage, green fodder, &c., for the welfare of the stock from which he expects to make a living. Last spring was a very favourable one for the growth of fodder crops, and only a few days ago I heard of a small farmer who then grew a good deal and made hay "till he was sick of it." The result was that, about the end of April, he had still something like 40 tons of good hay on hand, while his cream returns for the previous month amounted to £24.

A former rector of the Anglican Church here,* who, I believe, had had some experience in Mexico, was wont to say, regarding prickly pear, "You don't know what a valuable thing you have in it, or you would not want to have it exterminated." I have read of the shepherds, probably in that country, taking their flocks to the cactus-grounds and slashing the plants (there called "nopal") with long sword-like knives. The sheep followed them and ate greedily the lopped-off portions,† though they did not seem able to tackle the plant as it stood. In India much use is said to be made of the prickly pear for fodder, and its growth has been advocated as a factor in the reclaiming of poor waste lands. It is even said to be used sometimes for human food, and, indeed, in our own State I have heard of the tender shoots being eaten in the bush, but rather by way of an anti-scorbutic than as a table delicacy. I tried some once, prepared to resemble stewed fruit, but, like the Yankee, I don't "hanker after it," nor yet the fruit itself, though some people make preserves with it.

Not long ago I was told that in places the banks of the Moonie River are covered with a dense growth of prickly pear, through which narrow paths to the water are kept open by the cattle, and that frequently when a beast is killed for beef the tit-bit of the carcass—the tongue—has to be thrown away, so full is it of the little barbed prickles of the pear. Now, when the stuff is used for cow feed here, the preparation of it has for its sole object the destroying or rendering harmless of its many spines and prickles. Where practicable, a good plan is said to be to scorch these off by holding the pieces of the plant on a long fork over a clear wood fire, but the more useful practice seems to be to boil the stuff well—say, for three or four hours—such cooking, it is supposed, softening the otherwise hurtful parts and rendering them harmless. A warning has been given through the Press against feeding the stuff hot, in which condition it is said to be apt to cause stomach and bowel derangements.

Only last week, while passing along one of the main roads leading out of Ipswich, I had ample demonstration of the fact that a great many people are now feeding prickly pear. It was being taken away by dray, spring-cart, wheelbarrow, child's cart, and wash-tub, by men, women, and children, and the cooking utensils vary from the half ship-tank or 200-gallon pot down to the modest kerosene tin. Some are reputed to boil it by the half-ton, and fork out the pieces, laying them on what is by courtesy called the grass, and allowing the stock to help themselves. In such cases a supplementary ration of hay is or ought to be given. The owner of a cow or two will probably fill a kerosene tin with finely-chopped pieces (18 or 20 lb.), add water and always a little salt, set the vessel over an open fire or on the stove for a few hours, then pour off the water for use with next batch, mix the cooked stuff with a little chaff and bran, let it cool, and feed at milking time. As it is of a somewhat laxative nature, it is advisable to feed sparingly at first, but after a few days a cow will take from 20 lb. to 30 lb. a day without any apparent ill effects.

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* Rev. Herbert Heath.

† After the peons had burnt off the prickles with mesquit bush.—Ed. *Q.A.J.*

Opinions vary somewhat as to its feeding value. Some say, "Oh, well, it will keep the cows alive." That certainly is a consideration, but others assert that their cows keep up both condition and yield of milk; while one affirmed that the milk did not increase in quantity, but was much richer than before, and the condition of the stock improved. I am now experimenting on a couple of cows kept for home use, but with me the pear ration is an addition to and not a substitute for their present too scanty supply of other food, and already I note an improvement in quantity of milk, while the butter obtained is pronounced faultless (and there are some very sensitive palates in our house). Such succulent food, like immature greenstuff, if not in itself very nourishing, must also act as a corrective to the dry fodder to which the animals are otherwise limited just now.

In conclusion, I may say that I do not think the mere quality of a paper (embodying one man's opinion) read at such a gathering as this is of as much importance as the discussion on it, and the consequent bringing out of the opinions of many men. Though the present extensive use of the pear as fodder can hardly be considered as an important factor in dealing with or controlling what has hitherto been deemed a most troublesome pest, yet some useful information may be elicited if time permit and the subject be thought worthy of discussion. [A farmer at South Pine lately *fattened* fourteen pigs on prickly pear.—Ed. *Q.A.J.*]

Mr. Pearson W. Cameron (Ipswich): I certainly think that we may use the prickly pear as fodder in bad seasons. I used it myself for the first time about three years ago, and found no ill effects from its use, and I tried it again about six months ago. I have heard on some hands that the prickles are very injurious. Every farmer, however, occasionally has cattle that die on his hands, and when such events have happened to myself, and I have been feeding prickly pear at the time, I always hold a sort of *post-mortem* on the beast. On these occasions I have never found any prickles in the animals' stomachs, provided of course that the pear was fed after having been properly boiled. If you use it, it stands to necessity that you must feed some other fodder with it, and it is desirable that this should be of a dry nature. Dairy cattle I have found come on in their milk if they are fed with prickly pear mixed with some other stuff. Some feed the pear hot, but I do not hold with this. Cattle and horses get fond of the boiled pear, and I have frequently known them to take it in preference to other really good foods.

Mr. J. W. Lee (Zillmere): I was led by what I saw in the papers to try the pear, and have been quite satisfied with the results so far. The cattle seem to be better, and, moreover, the quantity of butter we now get from our milk is really surprising. I boil the pear, and this is sufficient to soften the small prickles. Boiling has no effect on the long prickles, and therefore I singe them over a fire preparatory to boiling. I feed the pear mixed with a little pollard, oats, or lucerne. The cattle then eat it ravenously, and it appears to have done them a wonderful lot of good. I consider it a very cheap fodder for cattle. I have to cart what I use 2 or 3 miles, and get a quantity from Sandgate. If the pear is boiled, and the long prickles singed over a fire, I do not think the slightest harm will occur to cattle fed on it.

Mr. J. Germain (Ipswich): I have very little to add to my paper, but I may mention one rather novel method of feeding the prickly pear to cattle. Brushwood is piled all over an isolated clump of pear and then fired. This destroys all the prickles, and the cattle are then allowed to approach and eat the singed pear.

The Hon. D. H. Dalrymple: I am going out to the Westbrook State Farm to-morrow, and I propose laying before the manager the advisability of his trying some experiments, conducted on scientific lines, with regard to prickly pear; that is to say, I shall see whether it will not be possible for him to draft off a certain number of cows, and feed them on the various fodders in general use; then to feed another lot on these fodders mixed with prickly pear, and, finally, to feed a third lot on prickly pear alone. The results, of course, would have to be carefully weighed, and, if we are able to arrange for the carrying out of the experiment, we ought to get some really useful information. I may here take this opportunity of mentioning that I have received a letter from Mr. A. W. Cameron, the president of the Wide Bay and Burnett Pastoral and

Agricultural Society, inviting the Department to hold the next Agricultural Conference at Maryborough. I take it that is to show the goodwill of the people of Maryborough towards these Conferences. But I may say that several invitations were received this year by the Department to hold the Conference in various towns in the State, Cairns being among the number. It is not unusual, I am pleased to say, for these invitations to be given, and they all receive consideration, but, of course, we cannot divide the Conference up into five or six different parts. Toowoomba was chosen as the place for the present gathering, and undoubtedly who ever may be in charge of the Department next year will give the question his best consideration, and advise the delegates accordingly. It is gratifying to find that the towns of the State are willing to extend their hospitality to this Annual Conference; and I thank Mr. Cameron, as president of the Wide Bay and Burnett Pastoral and Agricultural Society, for his kind invitation.

Mr. Albert H. Benson, the Instructor in Fruit Culture, Department of Agriculture, then read the following paper:—

FRUITS SUITABLE FOR DOWNS COUNTRY.

[By Albert H. Benson.]

Having been requested to prepare a paper on the above subject for this Conference, I will endeavour to make my remarks as brief and concise as possible, as were I to go into the matter at any length I should require not one, but a series of articles, as the subject is a comprehensive one, which, if treated properly, would require an amount of detail that it is impossible to condense into the time allotted for this paper.

In the first place, Downs country, taken as a whole, is by no means typical fruit land, the heavy blacksoil, treeless plains so characteristic of such country being better adapted to the growing of all kinds of farm crops suitable to the climate than to the production of fruit. At the same time there are patches of country all over the Downs that, given the necessary preparation of the land, the selection of suitable varieties, and the proper care of such trees when planted, will produce first-class fruits valuable both for home use and local consumption.

The most suitable soils for fruit culture are free chocolate loams with rotten rock subsoil, free loams of brown or red soil, and sandy loamy soils. When selecting an orchard site on such soils, see that it is as level as possible, or at any rate only gently sloping, as such soils usually have good sub-drainage. If the site selected is on a slope, heavy rainfall causes too much washing of the soil, especially where the land is kept in the high state of tilth so essential to the retention of moisture in the soil during dry spells, and on which successful culture will very largely depend.

Prepare the land thoroughly before planting; better get one acre well done than ten acres indifferently, as it will give more satisfaction and pay better in the long run. Plough the land well and subsoil as deeply as you can, so as to get as large a body of soil as possible available for the trees' use, as once the trees are planted it is impossible to get the land into as good a condition as if the work is done in the beginning. Remember that planting an orchard is not like growing a corn or wheat crop, which only occupy the soil for a few months, but that an orchard will occupy the land for many years; hence the initial preparation of the land must be as thorough as possible. This has been amply proved at the Westbrook and Hermitage State Farms, where the initial work was well done, and the trees have made remarkable growth and produced fruit of superior quality in consequence.

When planting, don't crowd your trees; 25 feet x 25 feet is quite near enough for most varieties, as, when the trees attain any size, the roots will occupy the whole of the ground. If crowded, cultivation is difficult, and the trees soon show signs of distress in dry weather; the result being a crop of inferior undersized fruit, which is of little value and hard to dispose of.

Keep the orchard well cultivated, prune thoroughly, keep diseases in check by spraying and the gathering and destruction of infested fruit. The best cultivators for orchard use are of the Planet Junior and Senior types, top notch cultivators, spring tooth cultivators, and Morgan spading harrow. As to pruning, I cannot give better advice than that already given in the *Queensland Agricultural Journal* by both Mr. Voller and myself; and for keeping down diseases the best all-round winter spray is the lime, sulphur, and salt wash, which is both an insecticide and fungicide; tobacco or resin washes are the best for black aphis in spring; and the gathering and destruction of infested fruit at all times is the best remedy for the fruit fly.

In selecting fruit for Downs country the question of earliness is of paramount importance, as early ripening fruit usually escapes the ravages of the fruit fly; at the same time, many of the best fruits are mid-season; and both in the case of those growing for the market and those growing for home consumption it is advisable to grow such fruits, so as to prolong the season as far as can be safely done. As to late deciduous fruits, although many varieties do well, the risk of fruit fly is too great; and also at the time at which they would ripen there is an abundance of superior fruit available in the Southern States which is being placed on our markets.

So many varieties of fruit will grow on the Downs that it is a difficult matter to make a selection of the most suitable, especially as some varieties do better on one class of soil than another. In the May number of the *Agricultural Journal*, Mr. Voller gives a list of the trees that, up till the present, have done best at the Hermitage and Westbrook State farm orchards; and as the soils at these orchards is characteristic of a large part of the Downs, I cannot do better than advise intending growers who have similar soils to consult the list given. At the same time, the following general information may be of some little value:—

ALMONDS.—Choose warm light soils in a position as free as possible from late frosts, as this fruit blossoms very early. Plant three or four kinds together, so as to secure fertilization of the flowers. Single trees are often poor bearers, owing to the fact that the flowers are usually incapable of fertilization by their own pollen. The best varieties are Early Jordan, Brand's Jordan, IXL, and La Prima.

APRICOTS.—This fruit does best on good rich loam, though it will stand a stronger soil than many other kinds of fruit. The trees require severe pruning at first, as they are apt to become very straggling if neglected; but, once well in bearing, the pruning is not difficult. The following varieties will be found to suit generally:—Pennant Hills Oval, Oullin's Early Peach, Moorpark, Hemskerke, Alsace.

APPLES.—Apples do fairly well on any soil, the heaviest black soils excepted, but are of best quality when grown on free soils. A very large number of varieties can be grown, but, for commercial purposes, only the earlier ripening sorts are worth planting. The following kinds do well generally:—Early Richmond, Carrington, Gravenstein, Lord Nelson, Lord Suffield, Scarlet Pearmain, W. E. Gladstone, Alexander, Trivett's Seedling, Frampton, Prince Bismark, Prince of Pippins, Twenty Ounce. Many other varieties do well, but the list given contains the most of the best kinds for marketing during December and January. If later varieties are wished, Jonathan, Stone Pipppin, London Pippin, Winter Majetin, and Monroe's Favourite may be tried.

PEARS.—This fruit does best on good rich loam—fairly strong land. It must be grafted on seedling stock, not suckers; if dwarf trees are required, it should be worked on quince, not hawthorn. The following varieties will be found most profitable:—Williams, Bonchrêtien, Clapp's Favourite, Beurre Bosc, Beurre Clairgeau, Marie Louise, Gansell's Bergamot, Winter Nelis; for cooking, Uvedale's St. Germain and Vicar of Winkfield.

PEACHES.—This fruit does well generally in any good fruit soil. To ensure fine fruit, the peach requires more severe pruning than any other fruit tree, as the best fruit is always produced on the strong wood of one year's growth. Many worthless seedlings are grown, but the following varieties have proved themselves valuable:—Governor Garland, Alexander, Brigg's Red May, Hale's Early, Foster, Elberta, Lady Palmerston, Globe, Robert Stewart. There are many other varieties, some much later than any of those mentioned, but there is too much risk of fly with any peaches ripening much later than the end of January.

NECTARINES require similar soil and treatment to peaches. The best varieties to grow are as follows:—Irrewarra, Early Rivers, Albert Victor, Elruge, Stanwick seedling.

PLUMS.—Nearly all kinds of plums do well on the Downs, though many varieties of particular species are not profitable, the fruit being either too small or inferior or the trees are not good bearers. Of the American type, the Red Cherry Plum is the earliest and best; of the Chickasaw type, the fruits of which are all practically fly-proof, there are several good varieties, though the fruit of some is on the small side Chickasaw plums must be worked on peach stocks, not suckers. The best varieties are:—Helm, Robinson, Wild Goose, Cumberland, and Golden Beauty. It is not advisable to plant many plums of this type, as they are not equal in quality to European varieties, though their freedom from fly is a great consideration to all who grow for home use. European Type:—Evans' Early, Crittenden's Prolific, Angelina Burdett, Reine Claude de Bavay, Diamond, Purple Gage, Washington. Japanese

Type are best worked on peach roots. Burbank, October Purple, Wickson, Red Heart, and Kelsey are about the best kinds. The trees are apt to overbear, and the fruit requires thinning. Unfortunately, the fruit fly is very partial to this fruit.

Figs.—This fruit does best on warm, well-drained soils, and in situations as free from frost as possible. Under such conditions the following varieties will all be found to do well:—White Adriatic, Brown Turkey, Brunswick, Coldi-Signora Nero, Large Black Genoa.

Olives.—Although there is practically no demand for olives in this State, there are, in my opinion, few places better adapted for the culture of this fruit than the Downs. The tree is a strong grower and most prolific bearer, and would make one of the best breakwinds or shade trees for the plain country. It does best on chocolate soils with rotten rock subsoil, but will thrive on almost any soil once it becomes established. I cannot say what varieties are likely to do the best, as only a few named sorts have been tried, all of which have certainly done well; so that I feel sure that most of the very best varieties for oil and pickling will do well.

Citrus Fruits.—No citrus fruits can be grown to compete with those raised in more suitable parts of the State; hence their cultivation is not recommended.

Loquat.—This fruit does well. The Gigantic variety is the best to grow.

Mulberries do well. The Black is the finest fruit where the trees can be got to grow.

Walnuts.—Though not cultivated to any extent, the walnut should do well wherever there are any deep alluvial soils, and, once it becomes established, it is likely to become a profitable tree.

Pecan Nut.—This tree will probably thrive in soils such as I have mentioned as being suitable to the walnut.

Berry Fruits.—With the exception of the strawberry, no berry fruits are worth growing. Where water is available, the strawberry will do well. Pink's Prolific, Trollope's Victoria, Royal Sovereign, and Laxton's Noble are some of the best varieties to grow.

Quinces.—Apple-shaped and Portugal are the hardiest and best.

Persimmons.—This fruit is not a success on heavy soils; on free soils, however, a few trees may be planted. Seedless varieties, such as Hacheya or Yemon are the best kinds.

Cherries.—I cannot recommend the growing of this fruit on a commercial scale, but for home consumption the following kinds can be tried:—Early Purple Guigne, Belle d'Orleans, and Twyford Bigarrean.

In conclusion, I may say that, for commercial purposes, apricots, plums, and peaches will probably be found most profitable, but any of the other fruits I have mentioned can be grown for local use or home consumption.

Mr. F. W. Warmington (Degilbo): In respect to this matter of the conservation of water I may say, as some members of the Conference have at various times alluded to other countries, that in my native county, Devonshire, there are rivers which without conservation would empty themselves the same as the creeks in Queensland do. There, as in the river Exe, for instance, various dams are thrown across the natural courses of the rivers, and sheets of water are thrown back perhaps a quarter of a mile; and I think if a similar system had been adopted with some of the creeks in this colony water would have been conserved for starving stock in many a district that now keenly feels the want of it.

Mr. Owen Jones (Peachester): Probably all over the world more money has been spent on water conservation than on railways; and in Italy, Spain, India, China, Egypt, Japan, and lately in Florida, immense sums have been spent. Spain has a lot of alluvial flats, and to-day 4,500 square miles of the Iberian peninsula are irrigated with the dams made by the Moors 600 years ago. The water rate charged is 26s. an acre, and for that you get 30 inches of water in the year, which pays enormously. The population of Spain is 81 to the square mile, but in the irrigated districts the rate is 1,600. In India the

famine of 1866 compelled the British Government to give special attention to this matter. The old irrigation works were repaired at a cost of £3,000,000, and this expenditure paid the Government an interest of 17 per cent. Since then, up to 1888, it has spent £31,000,000. The water rate is 12s. an acre, and it pays 4½ per cent. interest to the Government. Some of these irrigation works in India are of enormous size. One, which impounds an area of 35 square miles, has an embankment 12 miles long, and is bringing in a return of £11,400 a year. I believe there are 30,000 miles of canals in India, and nearly 300 separate masonry works. Irrigation is a matter which should be attended to by the Government in Queensland, for there are many places in the colony where irrigation works could be established, and which works would increase enormously the value of the country.

Mr. V. C. Redwood (Toowoomba): At Christmas you could not sell feed on the Downs, but now the want of it is being very keenly felt, and our farmers will find that they will have to conserve food as well as water for times of drought as do farmers in Europe, America, or other portions of Australia. In the older countries you will sometimes see stacks of straw or hay carried over for three years, but here, although some make provision for the lean years, still more seem to expect Divine Providence to do everything for them.

Mr. W. Deacon (Allora): I should like to correct Mr. Daniel in one statement. He says that individuals sold their straw at 5s., and now have to buy it back at £5. That straw was sold at 5s. in the stack, and if they did buy it back at £5 it would be as chaff in bags—a very different thing. But I do not know that straw is sold at £5. I have straw to sell, and only expect to get 25s. for it. We are told the farmer should not sell, but should store, but we are always told that when the drought is upon us. This lecturing farmers on what they should save is all very well, but the farmer is a grower and not a speculator. As a rule the most successful farmers are those who dispose of their produce on the first suitable opportunity, and a crop having been grown the sooner the farmer gets it to market the better for himself. I know, too, that is the opinion Professor Shelton used to express. It must be remembered that stuff loses weight. I cut hay at Christmas and put it into a good stack, but that hay in four months has lost 25 per cent. in weight, the dry weather having soaked every bit of moisture out of the stack. I should just like to express the opinion that we should go cautiously in this irrigation question. Irrigation for rice and cane is no doubt essential, but it is doubtful whether it will pay for general crops. It always seems to be taken as an axiom that irrigation will pay, and the methods of it are so well known that you can go in for it, if you have the money, right away. I notice, however, that last year the United States Government voted 32,000 dollars for experiments in irrigation to be carried out by the chief experiment stations. In consequence of that vote they are now conducting experiments in fifteen different States, and if in America they think it is necessary to proceed thus cautiously I think we can very well act in a similar fashion.

Mr. J. J. Daniel (Pittsworth): Mr. Deacon has somewhat misunderstood the meaning of my paper. In the matter of the price of straw I may have said £5, and perhaps I should have said £3. There are farmers where I am living who sold their straw at 5s., and to-day are paying £3 10s. for straw, in chaff. I know one firm who bought hundreds of tons of straw at 5s., and are now selling it at £3 to £4 per ton.

Mr. Deacon: As chaff, and in bags.

Mr. Daniel: I do not recommend that a man should keep all his crop, but I think he should keep enough stuff for his own stock's requirements over a possible dry spell. My great object in writing these letters was not to propound a water scheme, but to see if I could stir up individuals to individual effort. However, at these Conferences I have noticed that the tendency of the resolutions and recommendations seem to be in the direction of applications for

Government help, but I hope it will not be always so. We have had applications to the Government at this Conference for grass roots, for the clearing of our land, for bulls, and even for roosters. Let us, as individuals, try and rise above this sort of thing, and show some of the British pluck we possess, and that we do not ask for what we can get ourselves.

The Hon. D. H. DALRYMPLE: If time permitted I should like to express the pleasure which the reading of Mr. Daniel's papers afforded me. Mr. Daniel has shown us that if we do not provide against the risks of nature we must suffer. The moral of the papers is, I take it, that if we act on the recommendations they contain we shall undoubtedly escape being taught by a very much more painful process the lessons inculcated.

Mr. G. MOULDAY (Allora): The advice given by Mr. Benson is sound and good. There is no difficulty in producing fruit on the Downs, but there is in keeping it when it is produced. When the Diseases in Plants Act is to be put in force, I hope that particular part in the regulations dealing with the compulsory collection and destruction of fly-infested fruit will be first eliminated. I know that is a course of proceeding that Mr. Benson lays great stress on, and Mr. Benson is an able officer from whom I have got many a good hint. The enforcement of the particular clause, however, would entail a lot of expense and labour which I doubt would be justified either financially or by any material diminution of the fruit-fly pest.

Mr. J. G. PALETHORPE (Toowoomba): As a small fruitgrower, I rise to congratulate Mr. Benson on a really practical paper. As one who travels about the country a bit, I can endorse his remarks that there are only certain portions of the Downs suitable for certain kinds of fruit trees.

The next contribution was an essay by Mr. DANIEL JONES, of the Department of Agriculture, on—

METHODS OF IRRIGATION OF FRUIT TREES IN ORCHARDS IN VICTORIA.

[By DANIEL JONES, Department of Agriculture.]

In the few observations I am about to make regarding the very important question of irrigation in its relation to fruit cultivation, I wish to make it plain that the facts I propose to present to this Conference are the results of personal investigation into the question of fruitgrowing as carried on in various places in Victoria, where I have on several occasions had the good fortune to observe the utility and general success attending the systems of orchard irrigation in vogue in the localities I visited. The story of irrigation enterprise in Victoria, read in the light of the past fifteen years' experience, is one that to us Queenslanders will carry very important and instructive lessons. As an interested person in these questions, I can well recall the influence exercised by the Honourable Alfred Deakin, Bishop Moorehouse, Mr. McColl, and many other apostles of the water faith. It is quite sufficient for me to rapidly pass by the various postulates laid down by those gentlemen in some of their too fervid moments. Nevertheless, these men were men of staunch ideals, and, putting aside for the moment the excessive glamour they cast over the question, all who know Victoria to-day must admit that, although all their ideals did not prove as practical as they conceived them to be, nevertheless that State is to-day the better for the efforts put forth by those gentlemen, and this is amply illustrated by the labours of individual orchardists working on their own initiative or in connection with Government systems. These men have practically shown that irrigation scientifically applied to fruit cultivation means the difference between a precarious livelihood when depending on natural conditions for rainfall, as against that of the more certain and in every sense more profitable position of affairs resulting from the adoption of a practical method of irrigation. Probably no more dismal chapter exists in the history of irrigation than that which confronts us in the numerous and costly mistakes committed in Victoria in connection with irrigation schemes, both in proprietary and in State water trusts. Now, however, we in Queensland can learn and profit well by their mistakes. The vast sums of money ill-advisedly spent are to us special warnings *not to do* likewise. In this sense then we can congratulate ourselves in having practical experience, costly to others, at a very cheap rate to guide ourselves

whenever we seriously determine to attack this great question. Inasmuch as I desire, as far as I can, to present my remarks in such a form as to apply as much as possible to local conditions as regards irrigation, I will but briefly glance at the scheme of irrigation in vogue at Mildura, the premier irrigation colony of the Commonwealth. In the year 1894 I had the honour, with other delegates, to represent the Acclimatisation Society at the first Intercolonial Conference of Fruitgrowers held at Mildura in August of that year. The excellent reception accorded us and the valuable opportunities at our disposal to investigate cost, methods, and results stand to-day as among the most valued of my experiences.

If one lesson gained was more pronounced than another it was the good one—*to make haste slowly*. All who know of the fascinating manner in which such men as Mr. Deakin, then in the full fervour of his enthusiasm—strengthened as it was by reason of his visit to the Oriental countries, where irrigation is a great factor in agricultural practice—can present his ideas and schemes, can readily conceive how easy it was to form too sanguine expectations. Theoretically, perhaps, they were right in their expectations, but in the end things proved to many wofully wrong. Nevertheless, at the present time, Mildura as an irrigation colony, despite all its initiatory troubles, is, by virtue of assistance from the State and the pluck and perseverance of its fruitgrowers, more than holding its own. It is now giving comfortable incomes to those who in spite of difficulties have stood firm to the original idea. Many individual fruitgrowers now net profits of from £200 to £300 annually from 10-acre blocks. Equally good has been the fortune of the proprietors of the Ranfurly Estate, which is irrigated by a private scheme, who also adopt the pumping system from the River Murray. This estate has all along paid its proprietary consistent dividends of 10 per cent. interest annually—a gilt-edged investment in the eyes of the British owners.

Renmark, a little lower down the Murray, in South Australian territory, is also a successful irrigation colony. I have personal knowledge of the value of the profits accruing from the production of dried raisins, apricots, and peaches from these settlements, which now have overcome those initial difficulties inseparable from new schemes in new countries. As instancing the value of raisin-curing, a friend of mine last season at Renmark realised a return of 7½ tons of first-grade dried raisins from 3 acres of vines. This is itself a striking commentary on the value of irrigation in connection with fruit culture.

Scarcely any further evidence is wanted to prove the value of systematic irrigation than the show in our metropolitan warehouses of Mildura fruit—such as raisins, peaches, apricots, and lemons; all articles of daily need, that we ourselves by well-directed effort can supply from our own resources.

As it is not my intention in this paper to touch on the technicalities of irrigation, I shall leave Mildura with its interesting lessons. Those who are in any sense concerned either in co-operative production and distribution, as practised by these wide-awake settlers, can learn much that is profitable to copy as well as much to avoid. To us Queenslanders there is much that we may take to heart in the story of either success or failure that is presented as the experience of the promoters of this settlement. Before leaving this part of my subject I desire to mention that, in contradistinction to other systems I will refer to, the irrigation scheme in force in Mildura, owing to the high cost of pumping, fuel, labour, pipes, flumes, channels, &c., has for years been a heavy burden on the settlers. The defective channels have, in some instances, caused, by seepage, &c., great loss in more ways than one—causing, even with the superabundant supply of water in the Murray, some difficulty at times in giving the crops the needed quantities of moisture.

Comparing Mildura in this respect with the region adjacent to Mount Alexander, in the Harcourt district, we come to what is, perhaps, beyond question the best irrigated district in Victoria.

The Malmesbury Reservoir, from which the Harcourt district in common with many others is supplied, is a State enterprise, and it is now some years since its initiation. Originally a storage area of a capacity of 3,300,000,000 gallons, the increased demand for water for domestic, mining, and irrigation needs has necessitated a further addition to the area by the construction of a new reservoir, the capacity of which is even larger than the original one. The new basin, which has but recently been completed at a cost of £65,000, has a capacity of 4,000,000,000 gallons, derived from a catchment area of 72 square miles. In this connection we may profitably note that, while the original reservoir cost the State a sum of £100,000, the newer scheme of a larger capacity of 4,000,000,000 gallons cost £3,5000 less to construct. From this we may gather that new experiences and improved methods of construction are factors of encouragement to those who contemplate starting these enterprises. The

channels as constructed extend for about 60 miles from the reservoir, and serve in their course the requirements I have mentioned. As instancing the value of this unlimited water supply as a national asset, permit me to point out its unquestionable value in this direction. Taking but a single instance—that of the region contiguous to the Harcourt Railway Station. In this vicinity there are about 50 persons engaged in fruitgrowing, all with the aid irrigation furnishes them.

Last season's traffic from this railway station realised from these few fruitgrowers a sum of about £1,500 for the transport of fruit alone to Melbourne, or at the rate of about £30 for each holding. This, with the earnings from passenger rates, freights on goods inward, goes to show to what an extent irrigation enterprise is of service to the railway system of Victoria.

The Victorian Government is evidently alive to the importance of in every way encouraging these irrigation settlements, as instanced by the enterprise now on foot and well on towards completion—viz., that of constructing a long railway line to connect Mildura with one of the lines connecting with Melbourne.

The method of irrigation in this district is in most instances that by gravitation, as, generally speaking, the areas of orchard lie below the course of the water channels. In some cases, however, where areas of suitable soil are situated above the course of the water channel the usual practice is to supply the water to these higher elevations by use of steam pumps. These water channels are for the most part excavations on the hill sides to a depth of from 2 feet 6 to 3 feet and about 2 feet wide. The usual depth of water passing along, as measured by myself, was about 9 inches. These channels are not in any way lined or cemented, as the nature of the soil is such that simple excavation is sufficient for the proper conveyance of water.

The soil in this district is of a granite formation, and hence of a porous nature. This, at first glance, would suggest difficulties through percolation; nevertheless, experience has proved that little if any loss is occasioned from this cause.

The distribution of the water is in charge of an officer who is called the water-master. His duty lies in turning into such channels as are required the needed amount of water to supply the area proposed to be irrigated. His duty also is to see that the races are kept in good order, and that the flow of water is not restricted. This person also checks and allocates the amount of water each orchardist uses, furnishing him with the cost of such water, which is paid into the State revenue.

Notice to the water-master is given by each orchardist of the amount of water required, and of the date on which he proposes to begin his operations. The water-master then turns the water into the particular channel required, and by means of an adjustable stop bar locks a shutter so that a given quantity of water shall pass through the intake pipe. The price paid for the water in connection with this scheme is the very reasonable one of £4 per million gallons, a price that makes irrigation in this district a very profitable investment to all engaged.

The few particulars which I propose now to make use of have been furnished me by Mr. J. R. Warren, a gentleman well known to many Queensland fruitgrowers as a successful grower, and whose fruit commands, wherever it goes, the highest market price. As illustrative of this fact, I need only point to his success in the Brisbane market, and more recently on the London market, where this season's fruit shipped by him realised from 16s. 6d. to 18s. 6d. per case for apples, the result of his irrigation, without which this season his crop, in common with others without water, would have been scant in quantity and poor in quality. I make special mention of these London prices more to illustrate the value of the fruit despite a contention (made with some degree of truth) that irrigated fruit, especially apples, is deficient in keeping qualities. This instance and others that have come under my notice tend to prove that, whaever may be the case regarding fruits produced in other districts, the character of Harcourt apples for keeping quality and appearance cannot be easily surpassed.

The area irrigated by Mr. Warren comprises about 23 acres, comprising cherry, apple, pear, and plum trees.

Water is not applied as a general rule to young orchards. Until the trees are five or six years old they are simply well cultivated and manured. Then when the trees come into bearing, which they do at this age, water and chemical fertilisers are used in such quantities as appear necessary, having due regard to the nature of the soil and character of the crop. To reticulate the water to the various points needed, furrows are drawn from the intake to a distance of from 6 to 10 feet away from the trees and allowed to run until sufficient absorption takes place. In some orchards, dams are constructed at convenient places, and are filled from the irrigation channel as an auxiliary supply for emergency use should anything occur to interfere with the usual progress of watering.

The channel in question has an extent of 20 miles from this orchard, having a fall of 4 feet per mile, which serves to carry a good and sufficient volume of water for general purposes. The channels altogether extend for some 60 miles from the head works, furnishing all along this route water for the various purposes of mining, manufacturing, domestic use, and irrigation.

A few facts as gleaned from Mr. Warren will give evidence of the value of water to the fruitgrower.

Taking our profits on the basis of 75 trees per acre, as is the case in this orchard, we can figure for ourselves the net result. Cherries yielded about $10\frac{1}{4}$ cases each tree; plums, 15 cases per tree; pears, about $15\frac{1}{2}$ cases; apples, the same. Trees thirty to forty years old are known to yield as much as 25 to 30 bushels. These calculations based upon 75 trees to the acre, allowing for loss from damaged or low-grade fruit, and even owing to depressed markets, will realise a return of from £60 to £100 per acre, a sum, I am informed, quite within the scope of realisation, and amply justifies the inauguration of irrigation schemes wherever local conditions are favourable and the right class of people are ready to take advantage of the splendid systems for the development of rural occupations. Another feature of irrigation much in vogue in Victoria, and particularly in evidence in the Doncaster district, is the system of impounding water by means of tanks or dams. In this district, where no national scheme of water supply exists, the old adage of necessity being the mother of invention comes to us as proof of that piece of philosophy. There is, in this method of conserving water, no feature that is not practicable for almost every man engaged in fruitgrowing. It is very hard to conceive of an area of land adapted to fruit culture wherein there is no means of storing water either in excavated tanks or dams. This the enterprising settlers in the Doncaster and Boxhill regions have practically demonstrated.

This system of irrigation is, of course, dependent on a local rainfall; thus it is not quite so reliable a method as if the water came from a more elaborate system of conservation. However, the experience for some years past of the settlers concerned in this question substantiates the contention that it is practically within the reach of even the poor man to conserve such necessary water as will tide him over the periods of drought so common to all engaged in horticultural pursuits all over Australia. Taking as a representative holding the orchard of Mr. W. S. Williams, of Doncaster, I will briefly point out the salient features of his system. He cultivates about 40 acres of fruit trees, chiefly lemons. Next in order, pears, cherries, and apples. Mr. Williams' main source of water supply is from a dam constructed across a valley situated about the centre of his orchard. This was a work of some magnitude, but the results accruing from the financial point of view amply justified the expense. The water is raised from this dam by a 6-horse power boiler and pump. The water is conveyed to a dam constructed on the highest point of the land, and then, in the usual way, reticulated as demand may arise. Windmills are also in some instances used to lift water or force it to dams set on a sufficient eminence to profitably reticulate.

With many growers the sole dependence is placed on water conserved in tanks entirely depending on the catchment in wet weather. Although to some this system may at first glance appear a precarious one to lean on, nevertheless in practice it works out very well. In these regions so keen are some on this object that I have observed a good-sized dam constructed depending entirely for its catchment on a few chains of a public road. This speaks for itself as to the value set on this cheap form of water conservation. As these dams or tanks are mostly excavated by means of plough and scoop, the actual cost is not heavy, especially as this kind of work is usually done at such times when other matters of importance are not pressing. The value of every irrigation system is, as I have before stated, gauged by financial returns to those engaged, and here, no less than elsewhere, is to be seen the value of the application of water in the heavily-laden fruit trees as well as in the house comforts and general affluence of the cultivators.

Mr. J. W. Lee (Zillmere) said he was a believer in irrigation. What might suit Victoria might not suit the climatic conditions of Queensland. Moreover, he was not in favour of irrigation by throwing water on the surface of the ground or by running it through the land in rows of open surface drains. He had had a system of his own in operation for about ten years. This system he described at some length.

Mr. Owen Jones (Peachester): Mr. Jones went pretty fully into the subject of his paper, but there was one thing he did not mention. If you want

Plate II.

IRRIGATION OF SUGAR-CANE AT BINGERA, BUNDABERG.

1. Standpipe, 230 feet above river bed.
2. Dam, holding 2,000,000 gallons, being filled from main pipe.
3. Burnett River, showing water and sand.

to exhaust land as quickly as possible, the best way to do it is by thoughtless irrigation. When you begin to force crops out of the land you must manure, and manure heavily. Where irrigation is very profitable is where the sewage from towns can be collected, as on the sewage farms at Croydon, England, where vegetables of all sorts are grown, and their quality is found to be of the best.

Mr. H. N. Thornburn (Bundaberg) said: Mr. Lee had told them of an irrigation scheme of piping that he had patented, he understood, for watering fruit trees. That was all very well for orchards, but for a man who only had a small garden or a few trees he would describe a simpler plan. It was somewhat on the same principle as Mr. Lee's system, but all that was needed was a few earthenware pipes from 18 inches to 2 feet long, placed in a hole at the side of the tree, in which were a few bones, oyster-shells, or anything else that would act as a medium to allow the water to soak in. This was a very simple, effective, and economical appliance for watering the fruit trees.

Mr. J. W. Lee (Zillmere) said he had allowed the patent, which was chiefly in connection with the form of the pipes, to lapse. Anyone could use it.

Mr. J. G. Palethorpe, in thanking Mr. Jones for the information he had given, said that even if they had the gullies dammed up he doubted whether there would be any water to irrigate with. There was one creek at Gowrie, but he did not think the settlement down below would allow the creek to be dammed up to irrigate their fruit farms with. The only supply of water in his district was underground, and the question was whether underground supplies were good for irrigation purposes. Some he knew were, and some were not. It was for themselves to get to work to find the water, and, having found it, to learn whether it is suitable for irrigation or not.

Mr. J. Davies (Gympie) described a plan which he adopted in watering the trees in his fruit garden, which was to sink a flower pot near the roots. He obtained water from a well, however, and the great drawback was that the water was so cold that if it were applied to the trees on a hot day they were affected. The foliage hung for an hour or two after an application of the cold well water.

Messrs. J. Davies and Owen Jones discussed Mr. Thornburn's method of irrigation, the former gentleman stating that he adopted a similar plan, using a flower pot.

Mr. P. McLean (Agricultural Department): I can assure those present that Mr. Lee's system of irrigation has been a big success in many places, and a good many years ago I read a paper on "The New Agriculture," in which it was described. Mr. Lee, I believe, has improved on the system I then touched upon by having his pipes perforated at the sides. The question of irrigation is a very big one, but it is one that should be dealt with intelligently, as it is by no means everyone who understands irrigation.

Mr. McLean then instanced the case of a gentleman who spent £600 on an irrigation plant for his orange-trees. He had a very valuable orchard, and after he had been carrying on his irrigation for some time he began to discover that the leaves of his trees were turning yellow. He spoke to Mr. McLean several times about it, and when the latter visited the orchard he discovered that the trees were being drowned at the bottom and killed at the top, for the caking of the soil caused the feeding roots to be starved. Mr. McLean told him the plan that should be adopted, and he completely changed his system. When people talked about irrigation they had to remember that something more was required than water, for there was the question of taking the water off the land after it was put on.

Mr. D. Jones then replied to the remarks of the various speakers.

The next paper was by Mr. E. Grimley, of the Queensland Acclimatisation Society, Brisbane, on—

SOME SUBSTITUTES FOR SUGAR-CANE.

[By E. Grimley, Secretary, Queensland Acclimatisation Society.]

Major Boyd read the paper at Mr. Grimley's request.

The old adage that it is unwise to "put all your eggs in one basket" is as true now as in the old days of the misty past when these words became a proverb. Applied to agriculture, they mean that it is unwise to depend on a single crop. Take the West Indies, for example: For many years the sugar-cane was the sole source of wealth of those islands, and now that low prices are ruling for sugar there is wide-spread depression; or take Ceylon, with its dependence on coffee. When the coffee became diseased, nothing but ruin stared the planters in the face. To come nearer home, take our Northern sugar-planters. Now that sugar is on the balance, it is a problem as to what can be substituted, and the object of this paper is to show that there are many crops worthy of a trial. As these papers are to be somewhat curtailed, I shall not be able to deal very fully with each crop, and must limit myself to a few.

Before proceeding with my paper, I may state that I consider coffee, cotton, and rice good substitutes for sugar-cane; but, as they have all been dealt with by others, I am not writing about them, but am confining myself to subjects not yet generally grown or written about.

In connection with cotton, I may state that in the paper I read at the last Conference I hinted that a difficulty might arise from the fact that the crop generally ripened about the time of our wet season—save the mark! I have since received information that cotton in the North ripens its crop pretty nearly the whole year round, so that the chance of the fibre being spoiled by the rain is at least minimised. I also find that in the North it seems to grow as well and to yield as well for many years as it does in the first year. It is the custom in the States, and was the custom here when cotton was grown, to treat it as an annual and to grow from seed each year.

CASSAVA.

The cassava or tapioca plant is a native of tropical America; its botanical name is Manihot. There are two varieties—called *Manihot utillissima*, or bitter cassava; and *Manihot Aipi*, or sweet cassava. The former or bitter cassava is the one most in cultivation, but both are valued for their roots. Up till quite lately, the main use it has been put to has been the production of tapioca. The roots of the bitter variety are highly poisonous, but the poison is easily expelled by heat.

The cultivation is exceedingly simple. The plant is propagated by cuttings of the stems planted like sugar-cane. It thrives under most diverse conditions of climate, on high or low land, on humid plains or dry hills, but the soil must be friable and of good quality. Land that had borne several crops of sugar-cane would do well, as it requires different constituents from sugar. Yielding so largely, it is an exhausting crop, and for successive crops would require manuring—the crop yielding from 10 to 20 tons of roots per acre. The cassava is particularly a drought-resisting plant, and gives these large returns with a rainfall of only 14 inches in the year.

Tapioca is obtained in the following manner:—The roots are pulped in the same manner as arrowroot bulbs; the poisonous juices are expelled by pressure and washings, and the mass is pounded into coarse meal resembling bread crumbs, and when heated the starch cells burst, forming the tapioca of commerce. The roots of the sweet cassava can be used in a similar manner to the sweet potato as a vegetable. The value of the tapioca used in this Commonwealth amounts to £34,000 a year; this is the wholesale importing price, to which has to be added the duty, and to which extent Queensland could supply its protected market. The yield is, say, 10 tons per acre, yielding 17 to 20 per cent. of tapioca, or say 3,400 lb. at 15s. 6d. per cwt., giving £26 14s. per acre.

However, it is not to tapioca that we can look for anything like a large industry, and happily there is a product of the crop which can be utilised to a very large extent, and that is the starch. The demand for tapioca is limited, whilst the demand for starch for the Commonwealth is large, amounting to some £100,000 without duty, and there is the whole of that market open to Queensland to supply.

In Florida, where the coloured labourer is paid a dollar (4s. 2d.) a day, the crop is delivered on the railway trucks at 21s. a ton, being purchased by a central mill. Probably our sugar-mills could be utilised for the purpose of preparing the starch, as the business should be profitable, for cassava will yield starch at a cheaper rate than any known crop. It is calculated in Florida that an acre of maize will yield 40

bushels, producing 1,187 lb. of starch; whilst an acre of cassava, producing only 6 tons of roots, would give a yield of 2,400 lb. of starch.

The yield of tapioca and starch does not exhaust the good qualities of the cassava plant, as its usefulness in producing an article of food for cattle must be taken into consideration. It is found in Florida to be the cheapest known food for cattle. From experiments made, comparing the fattening qualities of cassava and corn, it was found that the profit on cassava was 48·42 per cent., whilst corn was 14·96 per cent. There are other products of the cassava, such as glucose and dextrine, which can be utilised.

To quote the words of the Manager of the Experimental Station at Florida: "With all the facts procurable, and with the experience of not only myself but of many practical farmers to support the opinion, I have reached the conclusion that cassava comes nearer furnishing the Florida farmer with a more universally profitable crop than any other he can grow on equally large areas; it can be utilised in more ways, can be sold in more different forms, can be converted into staple and finished crops, and can be produced for a smaller part of its selling price than any other crop." Why should we not grow cassava in Queensland?

JUTE.*

Jute is the material from which nearly all bags, bales, and woolpacks are made, and is the fibre obtained mainly from *Corchorus capsularis* found in the East from India to Japan. It is an annual, attaining a height of about 12 feet, and when closely grown is almost branchless. It is propagated from seed. It can be grown anywhere where cotton and rice will ripen, even in localities comparatively cold in the winter, provided the summer is sufficiently long. The crop is ripe when the flowers turn into capsules. The fibre is separated by steeping the full-grown plant in water for from five to eight days. Jute should be grown on good land well ploughed; it requires no irrigation, although it likes humidity. As a crop, it likes a damp situation, and should be just the thing for growing on the lower lands on the Isis, where sugar does not thrive. The crop is harvested in from three to five months, according to the season. Under favourable conditions from 2,000 to 7,000 lb. per acre are obtainable. It is best grown on flooded lands, as otherwise it is an exhaustive crop.

Under present conditions the fibre would have to seek a market in the old country or the United States, but if the policy of the Commonwealth is to be that of protection then it would be possible, with the help of a duty on bags and bales for Queensland, to supply all the jute required to manufacture all the gunny-bags, corn-sacks, flourbags, and woolpacks which are imported, reaching, in 1900, the value of half-a-million of money. Surely an industry of this dimension is worth capturing. I may mention that there are one or two varieties of *Corchorus* native to Queensland, but I am not aware if they have been tried for their fibre.

CAMPHOR.

The camphor of commerce is obtained from our common camphor laurel or, botanically, *Cinnamomum camphora*. This fact has, of course, been known for many years, but it was only when Mr. Peter Barr, a well-known London nurseryman, paid a visit to Queensland after visiting China and Japan, and so strongly insisted that it might become a large industry in Queensland, that I looked up the subject, and I was fortunate in finding a mass of information in the *Kew Bulletin*, than which a higher authority cannot be found.

The tree is so common in our State that it is not necessary to enter into any description of it. That it will grow along the entire seaboard in suitable soil is known to all, and probably it grows in the more Southern districts as well as anywhere in the world and as rapidly. There should be not less than 50 inches of rainfall in the year to grow it to perfection, and that is our average—a year like the present would not do any material damage to an established tree.

The camphor is obtained by the distillation of the trunk of the tree or of its roots, and from the twigs and leaves. In Formosa the trunk and limbs and roots are cut into chips by hand labour, and are then placed in a wooden tub about 40 inches high and 20 inches in diameter at the base. The perforated bottom of the tub fits over an iron pan of water on a furnace of masonry; a bamboo tube extends from near the top of the tub to the condenser. This consists of two tubs, the larger one right side up and filled with water from a continuous stream which runs out of a hole in the side; the smaller one is inverted, with its edges below the water forming an air-tight chamber; this chamber is kept cool by water running over it. The upper part of the

* Jute has been grown at Oxley, many years ago, 10 feet in height to the first lateral branch.

chamber is filled with straw, and on the application of heat the straw collects the camphor in crystals, and the oil drips down and collects on the surface of the water. It takes about twelve hours to distil a tubful by this method. About from 20 to 40 lb. of chips are required to form 1 lb. of camphor.

The essential principles involved are that the heat used must be uniform and not too great, and the steam, after liberating the camphor, must not come into contact with metal—that is, the tub and condensing apparatus must be of wood; the above appliances seem very primitive, and could probably be improved on scientific lines. Whether camphor can be produced at a profit, I am not prepared to say, but I think there is sufficient evidence for a trial, and the first effort should be to get an analysis of some of our trees about Brisbane. Possibly the Minister for Agriculture might allow the Agricultural Chemist to make an analysis.

Before quitting this subject, I might point out that Mr. J. F. Bailey, Assistant Government Botanist, wrote an article in January, 1896, advocating the growth and manufacture of camphor from a plant named *Blumea balsamifera*, or Ai camphor, an evergreen shrub of the Aster family, sometimes reaching the dimensions of a small tree. In this case it is only the twigs that are used, and the shrub is not cut down. The process of distillation is much the same as in the case of the camphor laurel.

It will be understood that I am not advocating that camphor should be taken up as a crop until further trial.

The concluding business of the session was the advocacy, by Mr. D. Smith, of Roma, of the desirability of the establishment by the Government of experiment farms on a large scale. Mr. Smith confined himself to the following heads:—

1. Choose 20,000 acres of land containing all the different varieties of soil.

2. Cultivate 10,000 acres or whatever quantity is required, and grow what kind of crops the soil will produce for future requirements.

3. Store up every kind of produce for future requirements.

4. Breed cattle, horses, sheep, pigs, and poultry from the very best herds and stock procurable.

5. The people then would have a good valuable stock for the district instead of continually breeding for inferior stock.

6. To stand these disastrous droughts, we must look to the growing of crops and the laying-up of a large supply of food for man and beast.

7. The present system of depending too much on next year's crops is defective, as we leave ourselves open to a fearful calamity if it happens to keep dry and no crops are harvested for two seasons.

Government Clearing Land to Encourage Settlement.

Owing to the extreme depression now existing in the land from these bad times, we must adopt some method of creatinu more circulation of capital and closer settlement of the people on the land. We wish to suggest what we consider would prove a productive outlay—

1. Choose spots suitable for agriculture.

2. The Government to have the land cleared, and then to throw it open for selections on easy terms.

3. The benefits, we consider, are as follow:—

4. Giving employment to people.

5. Encouragement to village settlement.

6. Distributing capital on a productive outlay.

7. Assisting and inducing people to go on the land by giving them the means to do so.

8. Land is now lying idle and is rapidly deteriorating by the growth of timber and prickly pear.

9. We consider the land when cleared would be selected at once and be eagerly inquired for.

10. This scheme would do away with the heavy burden that rests on the poor man, and the people would have the land under crops a good many years sooner.

11. The money spent by the Government would be quickly repaid, for men would prefer to pay for cleared land, as they could get a return quickly.

12. This would increase the wealth of the district, and give considerable amount of profitable employment to the poor man and increase population.

NINTH SESSION.

Thursday Evening, 12th June, 1902, 7 p.m.

This, the concluding session of the Conference, was occupied in adopting the following recommendations and resolutions submitted by the Committee of Resolutions:—

IMMIGRATION.

That this Committee of Resolutions tender a hearty vote of thanks to Mr. J. E. Dean for the paper read by him, and suggest that the Department of Agriculture communicate with Dr. Barnardo with a view to ascertaining if the system he has carried out with reference to forwarding boys to Canada, with a view to placing them on the land, could be adopted with reference to this State.

AGRICULTURAL BANK ACT.

That this Committee recommend to the Conference the desirability of so amending the present Agricultural Bank Act as to afford a much-needed relief to those whose land is already encumbered.

TENANT RIGHT.

That this Committee recommend the adoption of section 2 of the subjects for discussion at the Conference submitted by the Pioneer River Farmers and Graziers' Association—viz., the need for securing to outgoing tenants compensation for improvements effected by them during their tenure that are at the expiration of their occupancy of direct or realisable monetary value.

RETROSPECTIVE ACTION OF CUSTOMS DUTIES.

The Committee of Resolutions recommend that this Conference records its sympathy with the sugar-growers and others who suffer from the retrospective action of the Customs duties, and beg to heartily support them in their efforts to obtain relief; and that the Chairman of this Conference be requested to forward this resolution to the Premier of the Commonwealth through the proper channel.

INSECTIVOROUS BIRDS.

The Committee of Resolutions recommend that this Conference do warmly approve of the action of the Department of Agriculture in including the subject of insectivorous birds within the scope of its activities, and is, moreover, of opinion that it should take the necessary steps to ensure that no harmful animal or bird whatever be brought into this State, and, save only with the consent and approval of the Secretary for Agriculture for the time being, no animal or bird on the ground of its alleged insectivorous habits.

That this Committee recommend that illustrations of our most valuable insectivorous birds be prepared for use as object lessons to be used in the various State schools in this State.

PINEAPPLE INDUSTRY.

This Committee having duly considered these subjects, and having been advised that the matter has been taken in hand by the Chamber of Agriculture, recommend that this Conference heartily endorse the action taken by that Chamber in reference to the pineapple industry.

DISEASES IN FRUIT AND PLANTS.

That this Committee recommend that the regulations of "*The Diseases in Plants Act of* 1896," so far as they relate to the gathering and destruction of diseased fruit be enforced.

That this Committee recommend that steps be taken to enforce the destruction of the codlin moth on lines similar to those in force in Tasmania.

That this Committee recommend that the regulations of "*The Diseases in Plants Act of* 1896," so far as they relate to abandoned orchards, be enforced.

GRAIN ELEVATORS.

That this Conference recommend that the Department of Agriculture take such action as will result in the reproduction, in the report of this Conference, of Dr. Cobb's article on grain elevators appearing in the *Agricultural Gazette of New South Wales* for February, 1901, so as to afford full information to those interested in grain production; and that the Railway Department be requested to take such action as will result in the initiation of this system of handling grain.

VOTES OF THANKS.

Votes of thanks were tendered to the mayor and aldermen of Toowoomba, to the Royal Agricultural Society of Queensland, the Drayton and Toowoomba Agricultural and Horticultural Society, the School of Arts, the Gordon Club, the Turf Club, the Press, and the other public bodies of Toowoomba for the many facilities and kindnesses they had placed in the way of the Conference as a whole and the delegates individually. Special mention was also made of the generosity of Mr. George Essex Evans in presenting each delegate with a copy of his book, "The Garden of Queensland"; and of the work done by Mr. W. G. Scarle, the secretary of the Drayton and Toowoomba Agricultural and Horticultural Society, in promoting the comfort of the visitors. The Conference concluded with a vote of thanks to the Chairman, the Hon. D. H. Dalrymple, M.L.A., which was suitably acknowledged.

TRIP TO JONDARYAN.

By the courtesy of the Railway Department, the delegates were conveyed by special train to Jondaryan yesterday (Wednesday) afternoon, and afforded an opportunity of seeing the land recently thrown open for selection on the Gowrie Estate, and the adjacent Devon Park Estate. The opportunity was availed of by almost all the delegates and several prominent citizens of Toowoomba, including the mayor (Alderman Rowbottom), Alderman Palethorpe, the town clerk, and others. At Gowrie several of the delegates, the mayor, town clerk, and manager and secretary of the gas company, left the train and made an inspection of the Gowrie Coal Mine, the others continuing their journey to Jondaryan, where they were received by Mr. W. J. Burness, of the Rosalie Divisional Board. An inspection was made of the butter factory. Jondaryan, like most towns, has its eccentric character, who turned up when the train arrived, and caused a good deal of diversion, and likewise did a good stroke of business in the fruit line. During the trip the character and quality of the land passed were commented upon in most eulogistic terms, many of the delegates foretelling a great future for Toowoomba and district when the lands are fully cultivated. The trip was much appreciated, and gave an opportunity for the exchange of ideas upon many subjects by the delegates, the prickly pear especially, coming in for much of the discussion.

We learn that Mr. F. W. Peek has since received a letter from the chairman of the committee of the Toowoomba Hospital, requesting him to thank the delegates to the Conference for a donation amounting to £13 15s. collected by Mr. Peek from them for the benefit of that institution, and also expressing the committee's gratification that the endeavours made by the residents of Toowoomba to make the stay of the visitors enjoyable were so much appreciated by them.

Mount Coot-tha Reserve.

By the late W. H. TRAILL.

(Read before the Royal Geographical Society of Queensland by the Right Hon. Sir Hugh Muir Nelson, P.C., K.C.M.G., D.C.L., President of the Legislative Council of Queensland.)

From any part of the city of Brisbane, whence a view not interrupted by buildings is open towards the west, the prospect is seen to be bounded, in that direction, by a range of hills not of great height. These are known to-day as Taylor's Range, and while northerly they stretch unbroken till out of sight, they terminate abruptly towards the south in a bare knoll. This is Mount Coot-tha, formerly called One Tree Hill. As far back as anyone now living can remember it, that knoll was a prominent object in the landscape on account of its showing bare, while all the rest of the range was covered, as now, with forest. But there used, not so many years ago, to be one lofty tree on the very crown of the otherwise bare patch, and from that solitary tree the older name of the spot was derived. No one can now state with certainty when One Tree Hill was first so called. It is believed, however, that its obviousness dates back to the very early times when the site of Brisbane was occupied by a penal establishment, the furthest north on the east coast of Australia. The very road by which excursionists on a trip to Mount Coot-tha usually start, known, near the Victoria Bridge, as North Quay, and a little further on as Milton road, which skirts the Brisbane River for over a mile, was, the story goes, cleared and formed by the prisoners for the enjoyment of the officials, who were in the habit of taking their drives along that way, in the cool of evening, inhaling the freshened air wafted up the stream from the bay.

When, in the year 1880, the place was put in charge of trustees, it was not indeed a bare knoll such as it is at present. But, as compared with the rest of the range, it then carried but a young growth of saplings, so that it is probable that it was stripped of the original forest about the same time that the road mentioned was cleared and by the same class of labourers. This probability is supported by the fact that when the present clearing was being carried out on behalf of the trustees, some irons, such as were worn by the road gangs of convict establishments, were found on the place. Anyhow, it has been a favourite, though not a very commonly visited, place for picnicking excursions as long as Brisbane has been a town, and probably during many years before. There is no place within an equal distance of the city from which views so widely reaching and so far extending can be commanded. The height is just about right for affording a really interesting view. Great elevations are disappointing in that respect. The country and even lower hills beneath them appear flattened, and such objects as houses and other adjuncts are too distant to show any interesting details. From some of the lower buttresses of the Alps, for instance, 6,000 feet or so above sea-level, the extent of view is magnificent, and the snow-clad peaks and ranges at a distance very beautiful. But the valleys, with the towns, lakes, villages, roads, railways, and so on, show little except dots and streaks. Now, from Mount Coot-tha, one can distinguish almost every feature of the near landscape, which makes the view much more interesting, while there is no lack of beauty in the distant prospect, varying as it does from the seascape in the east to the bold outlines of the Main Range in the West, and detached peaks with a melting background of mountains far in the southward.

"Coot-tha" is a word in the aboriginal tongue, and means "honey." When in 1880 "One Tree Hill" was, together with a surrounding area of 1,500 acres, placed in charge of a body of trustees, as a reserve for public recreation, the question of an appropriate name arose. "One Tree Hill" had its antiquity and traditions to commend it. But the antiquity was slight, and the traditions few. Besides, the single tree, whence the name was derived, was seen to be doomed to speedy disappearance. Thoughtless and selfish people, among those who visited the place and enjoyed its attractions, were in the habit of lighting their picnic fire at the foot of the tree, thus slowly burning the life out of it. The process was complete years ago, and the notable tree, so long a landmark from the city of Brisbane, and for places much more distant for miles around, decayed, fell, and its fragments had to be cleared away.

Mr. W. H. Radford, Clerk of the Parliaments, who had, during many years admired and oft-times enjoyed the charms of the knoll, had been fitly appointed honorary secretary to the trustees of the reserve. He took trouble to cast about for a suitable name, and questioned, among others, an aged aboriginal of the tribe,

even at that time all but extinct and now entirely so, which once flourished as occupants of that locality. It must be understood that before the white man intruded, the country was parcelled out among different native tribes, each having exclusive rights over particular tracts, the limits and borders of which were well understood by the aborigines all about. Questioning this old survivor whether the knoll or range of which it forms part had any name, Mr. Radford learned that it had been known as "Coot-tha"—honey; the place of honey. There, in the good old days, when there were no white men to trouble people, bees abounded and "plenty sugar-bag sit down." In other words, hives abounded in the hollow trunks and limbs of the trees. The coast tribes had no share in this part of the country. They lived along the seashore, and had game and lots of fish. How plentiful was their supply of fish we know from the accounts given in 1823 to Mr. Uniacke, one of Lieutenant Oxley's companions on his first visit to Moreton Bay; by Finnegan and Pamphlet, the two castaways then rescued after living over a year among the natives. They had plenty, and weren't mean with it. The castaways were generously supplied by them with all they could eat. But honey was not plentiful so near the coast; and, of course, salt-water fish was not in the bill of fare of the tribes inhabiting the inland hills. So, according to this old blackfellow's story, at certain seasons the different tribes arranged to change places. The inland blacks left their district and trooped down to the seaside for the benefit of their health, and the seaside natives took a jaunt to the hills for the nice fresh air. The first mentioned had a good time fishing and sea bathing, and the latter were braced up by hill-climbing and bee-hunting. A pleasant memory of early reciprocity! Of course, the bees of those days were not the European honey bees since spread by swarms through the Queensland bush. They were the little stingless, fly-like, native bee, with their comparatively small stores of sweet but insipid honey, and they only nipped one's brown naked skin, instead of driving one crazy with venomed darts.

Enough of the name, however. The excursionist, arrived at the boundary of the Mount Coot-tha Reserve, finds before him a road with a pretty steep gradient, and which winds, following the course of the ridges, upward for about 1¼ mile. If a vehicle be used, the horses draw it at walking pace. The road seems a clever bit of engineering. The easiest ascents have been artfully chosen. But in reality, the smart engineering in this respect was done by cattle. The road, in fact, was formed to follow, generally, an old cattle track. It was not found possible to improve much upon the guidance of brute instinct. Keeping mostly along the crown of a spur overlooking the low country, amidst the original forest, here and there glimpses are obtained through natural vistas among the trees of the extensive prospect in one direction—southward—which is presently to be disclosed in its full beauty when the knoll above is reached.

It is quite likely that this knoll was cleared of trees at the instance of Captain Logan, who was Commandant at Moreton Bay from 1825 till 1830, when he was murdered near Mount Esk, a long way up the Brisbane River. Logan was a severe man and much hated by the convicts, of whom in one year alone, 1828, about 130 escaped into the bush, out of an average of 500 prisoners under his charge, and close upon half of the absconders are not known ever to have been heard of again. Logan was out exploring and was knocked on the head. It is supposed that natives, egged on, and probably assisted, by some escaped convicts, did the deed. But there is a lot of mystery about the affair. Anyhow, Logan was a very energetic and active explorer, and a very likely man to have caused this projection of the hills to be cleared of trees so as to afford a good view over the country. Every man who is familiar with the bush knows how tantalizing it is to climb to the top of a hill in forest country and find, after one's trouble, that no prospect can be seen on account of the trees on its summit. Besides, there are no bare-topped heights near Brisbane. The Glasshouse Mountains, away towards the North, are the only hills of that sort within a wide circuit. From Observatory Hill, on Wickham Terrace, in Brisbane itself, there is a fine and extensive view; and as the Observatory Tower was early built for a windmill, no doubt that nob had been cleared as far back as Logan's time, and the partial prospect from it would just serve to make a man, like Logan, with the instincts of an explorer, long for a more commanding look-out place.

That Captain Logan resorted to this spot for the sake of the prospect it afforded is not merely supposition. Mr. Frazer, Government Botanist, in his journal recorded a visit paid by him to Moreton Bay in 1828, when Logan took him and Allan Cunningham, a botanist, but better known as an explorer, and who had just a year before discovered the Darling Downs, to this elevation. Frazer mentions by name various distant peaks and mountains which were observed. His journal is printed in a volume of Sir Wm. Hooker's "Botanical Miscellanies."

Plate 11.

Looking towards Moreton Bay (the Mouth of Brisbane River) and the City.

A few Moreton Bay fig trees have of late years been planted on the crest of Mount Coot-tha, and give a pleasant shade. They have been so placed as not to obstruct the view, and people seated on benches which have been placed under them can enjoy the lovely prospect, while protected from the sun and fanned by the cool breeze from the ocean, which in summer seldom fails to temper the heat after noon. A few paces in front of these trees the trustees have caused to be erected a stone pillar, on the flat top of which is a metal disc engraved as shown below.

The engraved lines radiating from the centre to the circumference of this plate direct the eye straight towards the distant objects named on it. Little more than half of a circle is indicated on the dial. The hills, of which Mount Coot-tha is the projecting end of one spur, cut off the view in other directions. Those hills are themselves off-shoots from the D'Aguilar Range, which forms the northern watershed of the Brisbane River, and westerly separates it from the heads of the Burnett; while they throw off, a good way to the north, another chain, trending easterly towards the Pacific, known latterly as the Blackall Range, beyond which are upper waters of the Mary.

If one stands at the pillar and looks in the most northerly direction, where the view is unobstructed by the hills, it is just possible, in clear weather, to make out the situation of Sandgate and the glimmer of the waters of Moreton Bay beyond that watering-place. This is the least picturesque of all the scenes commanded from Mount Coot-tha. The intervening tract offers no prominent features for the eye to dwell upon. It is, in fact, a stretch of undulating forest country, with no marked characteristics. Yet, when one is familiar with details of early settlement in the Moreton Bay district, there is a disposition to dwell on this rather monotonous scene for a moment or two. Without being able to fix upon the exact spot, from this distance, one seeks to distinguish the locality, now known as Nundah, a not very populous outlying suburb on the Brisbane-Sandgate railway. It was formerly known as German Station. Here a missionary party of Germans, after being compelled by the hostility of the aborigines to abandon the place of their first settlement at Humpybong (Redcliffe), on the shore of Moreton Bay, established a mission station,

and dragged along an isolated, painful existence, still harassed by the natives, whom they found utterly indifferent to their endeavours at proselytizing, and whom they were constrained on more than one occasion to repulse with musket-shots. At Sandgate, also, which to-day is studded with marine villas, hotels, and cottages, and to which numerous railway trains daily run from Brisbane, the late T. Dowse and his son were wounded by the aborigines in 1853, or perhaps the late T. Dowse—"old Tom Dowse," as he liked naming himself—was the son. As recently as the sixties, several murders by the natives of lone fishermen and other white men occurred, and a detachment of black troopers was consequently stationed there for some years.

Cape Moreton is next indicated on the dial. A fine day, good eyesight, or a good telescope are necessary to distinguish this northern headland of Moreton Island. Captain Cook was the first man to sight this projection and to chart it, so far as maritime history tells. Following him came Captain Baudin of the French Navy, then Lieutenant Flinders entered the Bay, and thenceforth it was doubtless sighted by the people on numerous vessels which, after discharging at the Sydney settlement, voyaged to China or India. Some vessels also at the very beginning of the last century sailed from these places in Asia to Port Jackson, and their people may have sighted this among the other projections of the coast. One such vessel was despatched from India, expressly to convey to the penal establishment at Sydney there to serve a sentence of transportation, a young officer, Lieutenant Bellasis, convicted of having killed in a duel another who had insulted a lady of his family. On arrival at Sydney, however, the Governor appointed him to a military command, and a curious complication ensued. The officers of the New South Wales corps refused to associate with the "convict," and protested. A peculiar feature of their repugnance was that at least two of them had, not long before, themselves been duelling. Captain Macarthur, who before sailing from England had fought a bloodless duel with the master of the ship in which he was embarked, had challenged, fought, and wounded in Sydney the Commander of his regiment, Colonel Paterson, a very short time before this offender arrived under sentence.

But, although other old traditions are associated with Cape Moreton, it is necessary to pass on.

Indicated next on the dial is Moreton Island. The bearing points also to the South Passage, between Moreton and Stradbroke Islands. The dimly-visible land on the horizon is that of Moreton Island. The South Passage can scarcely be distinguished. That was the entrance to Moreton Bay used by nearly all shipping from the South for many years subsequent to the creation of a penal outpost at Brisbane in 1824, a crooked channel, rendered dangerous by sandbanks, which altered their shape after every gale. The wreck of a passenger steamer, the "Sovereign," in 1847, attended by terrible loss of life, and subsequently the stranding of an immigrant ship, the "Phœbe Dunbar," resulted in shipowners avoiding this perilous short-cut, although it was occasionally taken, in fine weather, till quite a recent date.

The visitor to Mount Coot-tha will, however, not overlook what is nearer. Along the same line of direction his vision travels over a portion of the general cemetery at Toowong, of which the white monuments and gravestones arrest the attention. Beyond these, to the left, cluster the buildings of metropolitan suburbs, and straight ahead lies the very heart of the city, partly hidden, however, by the ridge along which runs Petrie's Terrace. A little more to the right gleams one of the reaches of the Brisbane River, and other more remote reaches can be perceived in part, even to the lowest, where the river joins the Bay.

Whichever way one faces to look in the directions indicated in the dial, the Brisbane River is so prominent a feature of the landscape that it is natural to follow its course and to interest oneself in its story. When first seen by white men, this beautiful river had been, as far back as even imagination can carry one, short of geological conceptions, simply a haunt of aborigines. First visited by Europeans, when three castaways from Sydney, their boat bilged on Moreton or Stradbroke Island, had been humanely succoured by the aborigines there, it was ascended in 1823 by Lieutenant Oxley. That gentleman, then Surveyor-General of New South Wales, was on a voyage of discovery on the coast, his object being to find a suitable place for an out-station for convicts. Falling in with one of these castaways among the blacks at Bribie Island, and learning from him of the existence of such a river, he sought and found its mouth in the Bay, and ascended in a boat as far as Goodna, naming some of the reaches as he went. The first, from the mouth of Breakfast Creek, he named Sea Reach; the next name on his chart is Long Reach. This is the Milton Reach of to-day. The old name is preserved by a hotel at the corner of Queen Street and North Quay.

Plate III.

Between this line and that marked "White's Hill," the whole course of Milton Reach can be seen by the glint of the water. The name is comparatively modern. Between Mount Coot-tha and the river the scattered buildings are residences at Toowong. Beyond Milton Reach, one overlooks the whole of South Brisbane, across the flat portion of which the Parliamentary Building and Government House can be made out. The elevated parts, at Hill End and Highgate Hill, from this height look of less altitude than they actually are. One can scarcely realise the fact that those ridges are lofty enough to command, as they actually do, facing westerly, over the low-lying point of alluvial land which the next higher reach of the river can be plainly seen curving round, one of the loveliest and most extensive views conceivable, with the river in the foreground, forest ridges dotted with occasional white buildings in the middle-distance, and the bold outline of the great Main Range on the horizon. This view, in its nearer portions, has, owing to the similar relative position of the Highgate Hill and the river reaches overlooked with that of Richmond Hill and the course of the Thames, a striking resemblance to that prospect so famous for its beauty wherever the English language is spoken. But this South Brisbane view is the finer of the two. From Richmond Hill no such majestic mountains bound the prospect, and, as it were, serve as frame to the picture, and at low tide the Thames exposes on each side a broad slip of ugly mud.

That bare, low point just mentioned is known as the Santa Lucia Estate. It is difficult now to realise that all such plateaus of alluvial land bordering the river were, when first seen by Europeans, covered with dense scrubs, amidst and above which numerous noble pine-trees reared their lofty heads. On Oxley's chart, drawn from observations made during his first boat-ascent of the river, the lower portion of the area now covered by South Brisbane is noted as "rich land and fine timber."

Looking beyond the St. Lucia Point, and a little to the right, in the direction given by the line on the dial, marked White's Hill, two lines of high ridges are visible, beyond which the view melts away to dimness. On a knoll of the nearest of these ridges a building can be distinguished. That knoll is White's Hill, deriving its name from the present occupant of the building. It is often resorted to by excursionists. The further eminence beyond it is known as Mount Cotton, named after Major Cotton, who was Commandant over the Moreton Bay Establishment from 1837 to 1839.

The clustering buildings in the foreground, a little to the right of this line, are part of the pretty railway suburb, Taringa.

Mount Gravatt, indicated by the next directing line on the dial, can easily be identified, as it stands out boldly, and the clump of trees which crown its summit cannot be mistaken. This again derived its name from one of the commandants—Lieutenant Gravatt.

The buildings which intervene between the spectator and a river reach, which here is distinctly visible, are in the suburb of Indooroopilly. The fine railway bridge which crosses the Brisbane River at this point, can just be perceived as a delicate tracing. The reach of river thus spanned, known now as Indooroopilly Reach, was by Oxley named Canoe Reach, and is so set down in the copy of his chart which has been preserved by the intelligent foresight of ex-Judge Barron-Field, who was a contemporary of Oxley. The tributary, of which the mouth where it joins the river is easily noticed, and has cast up a bank or island of silt opposite to its junction, was also named by him Canoe Creek, and is so set down in a chart of subsequent explorations in 1829 by Allan Cunningham, who was in the boats with Oxley when the latter for the second time ascended the river in 1824. The old name was worth preserving, if only because it suggests a circumstance otherwise lost sight of in consequence of the disappearance of Oxley's journal of his first exploratory trip up the Brisbane, in 1823. It may be supposed that in that reach he saw a native canoe, a thing nowhere else mentioned in connection with the Brisbane River or Moreton Bay, except by the castaways Pamphlet and Finnegan, when telling their story to Oxley's companion, Mr. Uniacke. The northern point, where the river flows into Moreton Bay, was named after this Mr. Uniacke on Cunningham's map of 1829. Canoe Creek has, for a longer period than can be readily traced, been known as Oxley Creek, a meagre and insufficient tribute to the memory or that energetic and successful explorer.

The line which, on the dial, indicates the direction of Point Danger, points over rather featureless country, and the white, dotted buildings of Rocklea, a suburb extending beyond South Brisbane, on the ridges between the river and the old Ipswich road, are about the only objects for the eye to rest on before the prospect melts into a dim succession of undulating, timbered country, amidst which, and in about the same course, the South Coast Railway from Brisbane to Nerang and the New South Wales border runs, invisible from this point of observation, Point Danger is the place

where Macpherson's Range, separating Queensland from New South Wales, runs down to the Pacific, and there in the earliest times a sharp lookout was kept to intercept runaways from the penal stations at Brisbane and Dunwich, and from the boats' crews of prisoners who were stationed down the Bay. A good many absconders were caught at Point Danger and brought back to Brisbane town to receive the inevitable flogging of from 25 to 200 lashes.

The course of Macpherson's Range, which was named, probably by Captain Logan, after the Colonel of the 39th Regiment, then in Sydney, can be dimly seen, and guided by the line marked on the dial, a mass standing out, known as Tambourine Mountain, can be distinguished. Tambourine Mountain, however, is, like Mount Warning, not a hump on the main backbone of the Macpherson Range. An offshoot of that range, parting from it at right angles, nearly north and south for many miles, brings Tambourine Mountain, its northerly knoll, much nearer than the Main Range. Tambourine Mountain is worthy of particular notice, and probably destined, in time to come, to be a place of resort for people from the lowlands, who may desire an invigorating change of scene and of air. The summit of the range here is not difficult of access, spurs of moderate gradient leading up. When the top is reached a plateau of considerable extent is found to exist, formed of rich volcanic soil, seamed with running brooks and clad with forest and scrub. The elevation here is sufficient to give an agreeable coolness to the temperature. Most of the land has been parted with to selectors, and until complete railway communication is provided the place as a health resort is not likely to be spoilt by overcrowding. The access to it is capable of much improvement.

Just a little to the west of Mount Tambourine the lofty head of Mount Warning thrusts itself towards the zenith. The eminence was so named by Captain Cook because when it came in sight from the ocean it was time for the seaman sailing from the south to look out for the dangerous reef which juts out from Point Danger.

It is doubtful, however, whether any prominence on the line of mountains here forming the horizon is actually the summit of Mount Warning. There is visible just a little knob, in the direction of its bearing. But the crest of the Macpherson Range in that part of its course is lofty, and probably intercepts the view to Mount Warning. Were Mount Warning visible, the visitor to Mount Coot-tha, who looked upon it, would view part of "New South Wales." This mountain is situated, not on the backbone of the dividing range, but at the extremity of a spur which strikes to the southwards. The Tweed River has its source around the base of Mount Warning. Along this line the eye glances over the middle portions of the valleys of the Logan and Albert Rivers. Nearer, and, as it were, at the feet of the gazer, a long, sinuous reach of the Brisbane shows its shining surface, like a couple of lakes connected by a scarcely perceptible channel. This appearance is, of course, due to the ridges shutting out the view of its course here and there. This is the highest point at which the river itself is visible, although its course can be readily traced a long way further westerly.

Carrying the glance still further in a westerly direction, there begins to rise, in the middle distance, a nearer range of hills, which culminate in the striking peak, Mount Flinders, presently to be particularly referred to. Before reaching that eminence, however, there may be seen, with an unassisted eye, beyond a dip in the backbone of that range, between two mounds, far beyond them, a remarkably shaped mountain top. This appears to rise on both sides in sheer precipice. Somewhat further to the west, and about equally far away, two great peaks tower skyward, and the dial points to them by the names of Mounts Lindesay and Barney. The names of these three lofty mounts have been the occasion of much confusion, which has only while this paper was in course of preparation been reduced to order by investigations undertaken by Mr. R. M. Collins, himself a resident of the Logan district since early childhood, and familiar with every feature of the district. The first mountain just mentioned is now ascertained to be beyond reasonable doubt Mount Hooker—so named by Frazer and Cunningham during an exploratory trip with Logan in 1828, in honour of their mutual friend, Sir Wm. Hooker, then Mr. Hooker, Regius Professor of Botany at the Glasgow University. On all modern maps the name of Mount Lindesay is set against it. But on an old map of 1829, by Allan Cunningham, it is shown with the original name—Mount Hooker—set against it; and Mount Lindesay is one—the highest—of the two detached peaks just indicated, and is marked Mount Barney on modern maps. Mount Lindesay was first noticed and named after Major Lindesay, of the 39th Regiment, by Oxley, in 1824, during his second local exploration of the Brisbane River, when he saw it from a high peak, called by him Bellevue Hill, by Cunningham styled Mount Arucaria in his 1829 map, and now named Goat Mountain. This eminence is a part of the D'Aguilar Range, near Mount Crosby.

LOOKING TOWARDS OXLEY, INDOOROOPILLY RAILWAY BRIDGE, MOUNT TAMBOURINE, ETC.

Plate V.

Looking towards Mount Lindesay, Flinders' Peak, Cunningham's Gap, Mount Walker, with Ipswich on the extreme right.

Logan ascended to the top of Mount Lindesay, and thence perceived to the south-west some open country—evidently patches of the Darling Downs up Killarney way, at the head of the Condamine.

The wild and rugged country upon which these lofty peaks look down, mutely challenging all beholders to storm their formidable ramparts, has attracted, at long intervals, adventurers with spirit and disposition for the enterprise. Some years ago, Mr. Borchgrevinck, more recently associated with antarctic exploration, successfully scaled, in company with a Mr. Brown, the Mount Lindesay of the maps (actually Mount Hooker). But Mr. T. de M. Murray-Prior, of Maroon, a station in the neighbourhood, accompanied by Mr. Pears, now police magistrate in Rockhampton, had preceded him. As for the Mount Barney of the maps (the true Mount Lindesay of Oxley and Logan), before Mr. Borchgrevinck's feat, that had been ascended by a party of four, consisting of Mr. R. M. Collins (already mentioned), Mr. G. A. Kingsley (son of Chas. Kingsley), John Smyth, and J. G. Collins. These noticed the open country to the south-west as seen by Logan, and also that they were on the highest mountain in the vicinity. These facts set Mr. R. Collins thinking, and led him to the investigations which have disclosed the confusion of names, locally as well as on maps. There seems also to have been an earlier ascent, subsequent to Logan's, of which no written account has been preserved, or perhaps was ever penned. Local tradition, current as far back as 1865, and even then believed to relate to a time long antecedent, told of an ascent of the Mount Barney of that time, accomplished by some daring climber, who found a perilous way up certain clefts by availing himself of rope-like vines which hung and clung to the crevices. The story went on that since that feat a bush fire had destroyed the vines and precluded any repetition of the exploit. On modern maps the real Mount Hooker is (under the name of Mount Lindesay) figured to be 4,040 feet high, and the real Mount Lindesay (under the name of Mount Barney) at 4,500 feet. Allan Cunningham's observations gave for the latter a height of 4,700 feet.

Mr. R. M. Collins has, in a paper read in August, 1897, before the Royal Geographical Society of Australasia, very aptly called attention to a fact which may well be present to the minds of visitors gazing from Mount Coot-tha on those distant peaks. That is, that they are not mere inconsiderable mounts, but generally higher than the loftiest mountains in the British Isles. Thus, Ben Nevis is only 4,406 feet above sea-level, nearly 100 feet less than Mount Lindsay. Snowdon is but 3,570 feet, and the highest mountain in Ireland—a point of the Macgillicuddy Reeks—only 3,414 feet. Now, the whole chain of the Macpherson Range between Mount Hooker and the Pacific, as it stretches before the vision of an observer on Mount Coot-tha (the last fourteen or fifteen miles towards the sea are not in sight, the view being intercepted by Tambourine Mount) has a general elevation varying from 2,500 to 3,500 feet above sea-level.

Past the foot of Mount Hooker a track leads over a low point in the range into New South Wales, emerging near the extreme head of the Richmond River, the first station come upon being Unumgar. It was in the wilder country towards Mount Lindesay that, twelve years later than Logan's exploration, Surveyor Stapleton and an assistant named Tuck were killed by the blacks, and a third man, Dunlop, left for dead.

Standing on the summit of Mount Coot-tha, looking forth over the undulations of the forest-clad country away to the Main Range, the visitor at the commencement of the twentieth century can easily revive the impressions which may have moved his predecessors no further back than two generations. That tract, now parcelled out among graziers and farmers, was then a land of mysteries and dangers. Where railways advance towards its centre in 1901, no man could venture even in 1840, except at peril of his life. Could the romances connected with the working out of the change be but collected, they would furnish thrilling reading.

But it is necessary to push on. "Flinders' Peak" is the next eminence to which a line of bearing points the direction. This remarkable hill, the highest of several conical peaks of a secondary range between the spectator and the Main Range, was first perceived by Lieutenant Flinders (H.M.S. "Reliance") during his visit to Moreton Bay in the year 1799. He showed it in his chart, marked "High Peak." Copies of that chart were in the hands of every subsequent official explorer. Oxley evidently was familiar with it. From "Termination Hill," or from Bellevue Hill already mentioned, he saw the mount, and identified it as the "High Peak of Flinders." Hence by easy process the present name, "Flinders' Peak." In Adelaide, South Australia, there is a monument to Flinders' memory, and in Melbourne a street, but this striking peak must be the grandest and most enduring memorial of this, the

greatest of Australian maritime explorers, a worthy successor of Cook. The adventures of Flinders would suffice to fill a volume with romantic incidents. He seemed born to adventures and misadventures, and survived but a few years his detention at Mauritius as a prisoner of war by the French governor of that island under circumstances scarcely justifiable. But he died in his bed in his own mother country, being in that respect more fortunate than Cook, killed by savages, and still more so than his own sometime shipmate, Surgeon Bass (H.M.S. "Reliance"), with whom and a boy he explored the ocean coast of New South Wales, southerly, in a boat 8 feet long! Poor Bass voyaging homeward, and calling in at a South American port, was arrested as a foreigner and heretic, and never heard of more. It is believed that he thereafter lived and died a slave at the diamond-mines.

The lesser peak on the continuation of the range from Flinders' Peak is Mount Goolman. A little further to the westward, following the dipping slope of the same line of hills, a low knob will be noticed, beyond and exactly over which, at a great distance, another knob of almost identical shape will be seen topping a cone with sides of gentle slope. The distant knob is Wilson's Peak, the lofty mountain which rises at the point of junction of Macpherson's Range with the main Dividing Range.

Carrying the observation now along the latter, Cunningham's Gap cannot be mistaken, looking in the direction pointed in the dial. When Allen Cunningham, in June, 1827, pushing north from New England, discovered the Darling Downs, he sought further to find some route by which the coast could be reached; and, making for a remarkably excavated part of the Main Range, he discovered this opening, whence the Moreton Bay district is overlooked. The high mounts which stand sentry on each side of the pass he named Cordeaux and Mitchell. The latter—named after Sir Thomas Mitchell, Surveyor-General of New South Wales—looks a sort of rounded hummock, as seen from Mount Coot-tha. When one stands nearer its shadow, however, it bears a different aspect. Towards its summit, it presents almost perpendicular walls to would-be climbers. In later years, when the pass was considerably used by travellers from the Downs to Ipswich and Brisbane, there was a public-house there. It was kept by one Jubb, a comical character, being a brawny, stout man, with a soft, low voice and a trick of using much finer language and longer words than he was quite at home with. The late N. Bartley, in his gossipy book, "Opals and Agates," has a good deal to say about the gap and about Jubb. The merry blades of the fifties nicknamed Mount Mitchell "Jubb's bald peak." It was Jubb who, climbing up that mountain alone, as far back as the forties, met a lot of "Myall" blacks coming down, spear and boomerang in hand, and, to divert their attentions from his own carcass, made them understand that "plenty flour and sugar lie down along-a wheelbarrow," indicating the drays which were below, which they scampered down to sack. But the drays were well guarded in those days, and Jubb rejoined his companions in safety.

Not content with having discovered the Darling Downs and a gap opening therefrom to the lower coast country, Allan Cunningham voyaged up to Brisbane town the very next year, and undertook to reach the Gap from below. Captain Logan, the commandant, had just before discovered the mouth of the Logan, so he, Cunningham and Frazer, another botanist, started off to try and reach the Gap by travelling up that river. This brought them to the ravines at the foot of Mounts Barney and Lindesay, as already mentioned, and they had to turn back. But they made their way out by Limestone, now Ipswich. Cunningham parted from them near Flinders' Peak, struck off afresh with three men and two pack-bullocks in search of his gap, and this time found it, climbed up it, pushed through, reached places on the Darling Downs where he had been the year before and thence returned to Brisbane.

Many years had elapsed and Cunningham was in his grave in Devonshire-street Cemetery, Sydney, before his Gap was revisited by a white man. Captain Logan, too, was dead, and Lieutenant Gorman was commandant in his stead. It was in 1841 that Patrick Leslie, the first squatter to take up country on the Darling Downs, following the directions in Cunningham's journal, made his way to the pass, attended by his faithful henchman, Peter Murphy, *alias* Duff, "a lifer," and gazed wistfully on the prospect below and before him, straining his eyesight to discover some indication of Brisbane town. Murphy, eagerly scanning the distant prospect, asked him whether there was a church at the settlement. Leslie had no knowledge of such a building existing, but told him there was a windmill, upon which Murphy told him he saw it. This was the present Observatory tower, and, as lime was abundant, no doubt it shone brilliantly white. Leslie and Murphy clambered down the pass and made for Limestone, but after some progress turned back, as Leslie had no permit, without which at that time no one was allowed to approach within 50 miles of the penal settlement. He has left no record of his impressions when he stood on the brink of

Cunningham's Gap, viewing the wide, wild prospect before him. Leslie was not a sentimental man. Mr. Bartley has, however, word-painted the picture from the same spot:—

"Glorious was the view to the south, over the peaked mountains which mark the heads of the Clarence and Richmond Rivers, from this 1,900 feet of elevation; while another 1,900 feet above me, or 3,800 feet in all, there appeared, sitting high as it were on a silvery bank of fog-cloud, a solitary stone pulpit in the sky, being the narrow, rocky, eastern 'horn' of 'Mount Mitchell,' that looks over to the sea and the savannahs of West Moreton; all the rest of the mountains between me and it being robed in the cloud over which peeped this apparently air-borne, spectral, stone pulpit; it might have been a balloon a mile in the air, so little seemed the connection between it and the earth below, and it was a sight of unearthly beauty rarely seen."

A little later than Leslie's journey, Messrs. Elliott and Hodgson descended the Gap and made their way through to Brisbane. No doubt they had permits. Elliott had been General Sir Geo. Gipps' aide-de-camp. He must not, however, be confounded with the first Speaker of the Queensland Legislative Assembly, whose portrait ornaments the Parliamentary library. On their return these two gentlemen, who had occupied country on the Darling Downs, brought their bullock-drays down the Gap—a tremendous job. They had no hope of getting them up the same way, and, Commandant Gorman personally assisting, a better ascent, known on account of its merits as Gorman's Hell-hole Pass, was discovered and made possible, reaching the top of the range near Drayton. However, this lies out of sight from Mount Coot-tha, so it is not necessary to pursue this matter further.

Turning slightly to the right, a group of white dots shows the situation of Ipswich. Only buildings on the higher ridges are thus visible. Further round the prospect is cut off by the southernmost points of D'Aguilar Range.

But although the scope of the prospects from Mount Coot-tha is thus limited, the scenic resources of the reserve of which it is but one of many eminences are by no means exhausted. The visitor, quitting the Mount and leaving behind him the shade of the leafy fig-trees and the conveniences provided in the way of a plain pavilion and water-tanks supplied by the rainfall on its roof of iron, will find a cleared but unformed track leading along the saddle of a spur to other knolls whence different and interesting, although less extensive, views present themselves. To the west and north-west the irregular banks of the D'Aguilar Range rise, embaying a rugged valley, above which, on bluffs half-way towards the summit, are clearings, buildings of Brookfield, where, availing themselves of patches of volcanic soil, enterprising settlers cultivate sugar-cane, while enjoying lovely views towards the river.

So far the views from Mount Coot-tha have chiefly suggested memories of past times. In imagination the eager Logan and the Commandants who succeeded him have been seen on this eminence scanning the far-extending landscape, observing the numerous threads of smoke which indicated to them where the abounding natives were grouped around their fires, and pondering on the mysterious possibilities of the unknown interior which lay beyond the distant mountains which closed in the prospect.

The theme may now be varied, and conception be exercised to idealise the scene which will, a century or two hence, disclose itself from this standpoint to the observant visitor of those times to come. Perchance by then the garment of forest, which now covers the land with almost unbroken monotony, will, like the pines and brushes of the early days of white man's intrusion, have been improved off the face of the land. Where now painted cottages of wood dot the scene along the river's course, palaces may have been reared. The cold and foggy valley of the Thames may then have lost its present throng of inhabitants, and, under a kinder sky and in a more genial climate, there may here be that concentration of population which the beauty of the country appears as though created to attract and retain.

Note.—The distant peaks and mountains not coming within the range of a photographic landscape, the accompanying illustrations have been reproduced by photo-engraving from a fine water-colour picture, painted by Mr. A. Thomas, of the Survey Department, and kindly lent by him for the purpose.

Agriculture.

A NEW POTATO PLANTER.

This is an age of novelty (says the *Farmer and Stockbreeder*). Altered circumstances demand new methods, and never was there a time when the inventive genius had greater scope or was better requited for his work. Amongst the latest of the new farm appliances which from time to time we have noticed, is a new potato plater, brought out by the Hon. Cecil Jervis, Norton, Disney, Notts. This implement is remarkable more for its simplicity than intricacy, and by farmers has been spoken of in terms of high praise. The block which accompanies shows at a glance the principle of the implement. By the old system of hand-planting, 1 acre a day was very hard work for a man. It is claimed and demonstrated that by the use of "The Jervis Potato Planter" 2 acres can be comfortably planted by a man in a day, so that the saving in labour is not inconsiderable. Emerson says, "There would be more tillers of

the soil if the work could be brought breast high," and the doctrine expounded by the eminent essayist finds practical application in this new appliance. Not only is the exertion of stooping done away with and time economised, which is equivalent to economy of the labour bill, but regularity of work is ensured. It is claimed that the labourer can walk along the furrows at walking speed. Three potatoes are taken at a time from a hopper, slung over the shoulder, and dropped into the planter. It takes them accurately, and the seed is deposited with equal accuracy. The hopper is hollowed in the side, and made to fit the body, so that it does not sway with the motion of walking. Not long ago a trial took place on Mr. Alfred Simpson's farm at Allerthorpe, near Pocklington, where its work gave great satisfaction to a large number of farmers. The inventor was demonstrator, and set seven rows of seed at the rate of an acre in three hours and twenty minutes. This was accomplished by the use of a cart, but when planting from sacks on the ground an acre was covered in four hours—very good work indeed.

PASPALUM DILATATUM.

From all parts of the States we are constantly receiving letters in praise of this fodder grass. It thrives equally in the Far North, the South, and West, notwithstanding the dry state of the country. We have now additional testimony to its value in a letter addressed to the Principal of the Agricultural College by Mr. Geo. W. Wright, of Bald Hills, who writes: "Respecting the plants I received from you (2,000) and planted last September, although there has been a terrible drought, I may state that I have cut the crop twice, which shows how well it has grown under the adverse conditions. You may depend that I am satisfied with it, and do not fail to recommend it to dairymen and others. I have, in addition, saved nearly 40 lb. of seed, ready to sow when you think is the best time."

A variety of this grass, known as *Paspalum conjugatum*, is widely distributed on the Johnstone and other tropical rivers in the Far North of Queensland, as well as in the Old World. Our valued contributor at the Daintree, Mr. Th. Pentzcke, describes it as being "more valuable than a goldfield" and a widespread blessing. The seeds are carried about on the hoofs of horses and cattle and on the soles of men's boots, and thus the grass is distributed wherever civilised man dwells. Mr. Pentzcke says that an ounce of seed will, when grown, smother the useless turpentine grass. Time was when, on the Daintree, there was not a blade of grass for the cedar-getters' cattle, but the Messrs. Freshney brought up bales of hay, amongst which were thousands of fertile seeds. These became scattered along the timber tracks, and grew and flourished. Panicum is everywhere to be seen along the banks of the anabranches of the Daintree River, and five different varieties of *Paspalum* afford abundant food for stock. We may here remind Mr. Pentzcke that the *Paspalum conjugatum* was discovered in 1772, and named by Bergius.

Other grasses rapidly spreading on the Daintree clearings are Natal grass (which the cattle do not much care for); *Panicum spectabile; Phalaris canariensis*, or canary grass, a very useful grass where poultry are kept, as it seeds very freely and the chickens are very fond of it.

Mr. Pentzcke mentions the matter of sisal hemp, of which he had intended to plant 10 acres, but the constant heavy rains have prevented him from burning off the felled scrub. The patch of plants has thriven marvellously, and presents such a mass of threatening bayonets that no hawk would attempt to pick a chicken out of it.

As for *Fourcroya gigantea*, he advises farmers not to plant it unless they have the means of regularly turning it into hemp, and thus preventing its arrowing. The seeds of the flowering stems are scattered far and wide, and the resulting plants threaten to become a serious pest. This, at all events, proves the suitability of the soil and climate of the North for the growth of the plant. The fibre content may, however, suffer from a too great succulence and luxuriousness of the plant.

THE BRITISH BARLEY SOCIETY.

The importance of the proper management of a barley crop has been clearly shown at the late Agricultural Conference at Toowoomba, by Mr. V. C. Redwood, whose paper on the subject deserves the careful consideration of growers of that cereal. So great is the importance attached to the barley crop in England that a society has been formed in London (11 Queen Victoria street, E.C.), known as the British Barley Society. The objects of the society are stated as follows:—To improve the character and quality of the barley; to aid growers in every way by furnishing the fullest information as to soils, seed, rotation and manures, stacking, threshing and dressing; to encourage the better use of barley, and to foster arable cultivation of the soil, &c.

REPORT ON WORK—QUEENSLAND AGRICULTURAL COLLEGE.

MAY, 1902.

Farm.—No change has taken place in the weather since last report. We have experienced warm and windy days, with cool nights, but no frosts. The rainfall for the month was ·04 inches for two days. We still have plenty of dry grass upon which the live stock appear to hold out well, no hand feeding being done with the exception of the milch cows and the working horses. Work on the farm: Grubbing, stumping, and burning 30 acres in the Gatton paddock, the large green trees being pulled down by means of the "forest devil." A number of stumps on the hill near the stables were also grubbed and burnt. A large quantity of sawdust was carted from Gatton for bedding. The breaking up of 15 acres in the sheep paddock was completed, and the 40-acre creek paddock was cross-ploughed. Finished the manuring of No. 6 plot of 5 acres, at the rate of 26 tons to the acre, ¼-acre being left unmanured for comparison. Three acres of plot 3 were also manured. Drills were made in plot 6, so that advantage may be taken of the first rainfall by planting without delay. During the last week of the month 10 acres of malting barley were planted in 40-acre paddock. The clearing and grubbing of new 30-acre paddock is almost finished, making a total of 75 acres rendered fit for cultivation during the last two months.

Garden.—The orchard and vineyard are now beginning to feel the effect of the long-continued dry weather, but the constant cultivation benefits them considerably. In the garden a great deal of planting has been done, seeds of kohl rabi (3 varieties), beetroot (2 varieties), turnips, radishes, peas, and parsnips having been sown. All the above have been irrigated, and a marked improvement has been noticed. Several rows, each containing from 80 to 100 plants of cabbages, cauliflowers, and broccoli, have been planted out. Cabbages, cauliflowers, kale, onions, and lettuce have been kept well irrigated, no other form of watering being of much value. The spray pumps have been kept going, using Paris green and tobacco water for grubs, aphis, &c., which have attacked the cabbages from time to time. Two rows of Burpee's Surehead and Drumhead cabbage, planted in February, have done well, the average weight per head being 11 lb. They had been well watered during their growth, and a little liquid manure, chiefly urine from the stable, occasionally used. Twenty-four loads of manure were carted to the garden, spread, and ploughed in. Owing to the dry weather, a very great deal of irrigation has been necessary, this having given much work. On the whole the vegetable garden never looked better, and is much admired by visitors.

Dairy.—During the month 1,162 gallons of milk were converted into butter for a yield of 505 lb., and 460 gallons were supplied to the dining-hall. Forty-eight head of cows were milked daily, and were fed morning and night on wheaten straw chaff, which had been steamed, and to which molasses had been added at the rate of 4 lb. of molasses to each cow daily. On one occasion, when the molasses ran short, a considerable decrease in the milk yield was noticeable, and also when the chaff was fed unsteamed. I strongly advise those who feed dry chaff to steam it before feeding to milch cows. This may be done at little cost, as follows:—Make a frame of 6 by 1 foot boards, high enough to hold the required quantity, and place on a wooden floor, when boiling water mixed with molasses should be added in sufficient quantities to cause the stuff to become soft and succulent. Whilst steaming, cover with a sheet which may be made of old bags. The herd was also allowed to graze for three hours daily on the lucerne and paspalum plots. The natural increase during the period was 2 grades and 3 Shorthorns. We disposed of 13 head of fats to a local butcher at a satisfactory figure. The stud bull, Lord Harry, has been sent to the Biggenden State Farm.

Piggery.—The increase for the month comprised 8 Berkshire boars and 7 sows, and 7 Mid. Yorkshire-Berkshire cross. During the month we disposed of 10 pedigree pigs for breeding purposes, including 3 Berkshire boars, 5 sows, 2 Mid. Yorkshire boars; also 4 fats for factory purposes. We killed for curing 14 head of baconers.

AVERAGE VALUES OF CROPS IN THE WESTERN AND SOUTH-EASTERN STATES OF AMERICA COMPARED WITH QUEENSLAND VALUES.

Florida produces on an average 92 bushels of sweet potatoes per acre, and in food value this is equal to the produce of 3 acres of English potatoes. Rice averages 19 bushels per acre, with a food value of 1,680 units, whilst Northern wheat flour, at less than 20 bushels per acre, has a food value of 1,675 units.

Take the average value of the principal crops of the Western States per acre, as given by the *Florida Agriculturist.* We give the values in British currency—

Corn, £2 3s. 4d.; wheat, £1 19s. 1d.; potatoes, £4 11s. 9d.; hay, £3; tomatoes, £9; cabbage, £8.

Now compare these returns with those of Florida. In that State the leading crops average—Sweet potatoes, £8; corn, £1; rice, £5; upland cotton, £1 17s. 1d.; Sea Island cotton, £1 18s 6d.; sugar-cane, £12 4s.; Irish potatoes, £11; cabbage, £14; tomatoes, £14; cantaloupes, (rock-melons), £11; strawberries, £18.

To obtain these results in the west, the farmers spend, on an average, £4 per acre in fertilisers. Now, deduct £4 from the receipts for potatoes, cabbages, tomatoes, rock-melons, and strawberries, and the Florida farmer receives more per acre for everything subject to comparison.

How do the Florida farmers manage on their poor yellow sands? They crop their land in corn in unbroken succession for twenty, twenty-five, or thirty years, the crops getting better every year; and beggar-weed is the secret. The land grows its own fertiliser. All the farmer has to do is to plough it under, and he saves £4 per acre.

How do these returns compare with those of Queensland soils where no manure is needed for the crops mentioned?

Corn yields £6 per acre; sweet potatoes £20 per acre. (At the penal establishment at St. Helena 35 tons of saleable potatoes were harvested per acre on 6 acres in 1897, which sold at £6 10s. per ton, the largest potatoes weighing 34 lb.) This was equivalent to £227 10s. per acre. The variety planted was Maltese. The soil was red volcanic, and no manure was used. They were planted on hills 3 feet apart. This is taken from the official record of the Comptroller of Prisons. We have ourselves grown 15 tons per acre, sold at £4 per ton, but this must not be taken as the regular average return for Queensland.

Rice in the south yields 40 bushels of paddy per acre, worth 6s. to 7s. per bushel for seed, and for market 5s. per bushel, or £10 per acre; cotton is only now again attracting attention, but when cotton was extensively grown here during the American civil war, the average yield was 1,000 lb. of seed-cotton per acre, the yield often rising to 2,000 lb. At 6d. per lb. the average return amounted to £6 10s. per acre for lint, the farmers getting £3 per acre net for the seed-cotton. Coffee at 8 cwt. per acre will return from £34 to £40 per acre. Sugar-cane without irrigation, in good seasons, averages 20 tons per acre, giving the growers £12 per acre; but irrigated cane returns 50 tons, worth £30 per acre. English potatoes average from 4 to 8 tons per acre, returning as a rule £3 to £4 per ton, or £12 to £32 per acre. Cabbage is not much grown as a field crop, but farmers in the Stanthorpe district grow 10,000 cabbages per acre, selling at from 6s. to 9s. per dozen, or at the rate of from £240 to £600 per acre. Strawberries grow to perfection in Southern Queensland. 10,000 to 16,000 plants go to an acre, and the yield of fruit reaches 7 tons per acre; but the average yield may be set down at 2 tons, the price averaging 3¼d. to 4d., or about £75 per acre. Tomatoes, cucumbers, rock and water melons return large profits. Now, all these crops are raised without manure as a rule. The Queensland scrub soils, and the rich, deep, volcanic soils of the plains have been cropped for years without deterioration, yet fallowing, rotation, and manure are negligible quantities so far. The sugar-cane fields

have to be manured rather heavily, but it is safe to say that not 20,000 acres of the cultivated lands of Queensland have ever been manured, and less than that area has been irrigated.

The great drought of 1901-2 had a most disastrous effect upon the Southern and Central sugar plantations, as shown by our illustrations in the June issue of this journal, yet the wheat crop was the largest and best for quantity, yield per acre, plumpness of grain, and freedom from rust, that has yet been produced in the State. An average of nearly 20 bushels per acre in spite of drought surely points to Queensland as being a State pre-eminently fitted for cereal-growing. With wheat at 4s. 6d. and 4s. 8d. per bushel, the farmers have every reason to be satisfied with their lot.

CONSERVATION OF MOISTURE IN THE SOIL.

[By G. B. BROOKS, Manager, State Farm, Biggenden.]

The present drought has been the means of impressing more deeply upon farmers, fruit-growers, and others that water is one, if not, the most important factor influencing the growth of crops. This is to be seen in the agitation now being made in the matter of supplying water to the crops by means of irrigation. In the future, irrigation will, no doubt, play a very necessary part in the operations of the successful Queensland farmer. The field to be operated upon is a large one, and many things have to be considered before water can be applied by this means to such a vast area. Important as this side of the question is, nevertheless there is another which calls for equal consideration. This is the conservation of moisture in the soil that Nature supplies in the shape of rain. It is true this supply has of late been a poor one, still this makes it all the more imperative that we should do our utmost to retain what little we do get. That moisture can be conserved in the soil for some considerable time is no new theory, for we read that in some parts of America good crops of wheat can be matured upon an annual rainfall of some 12 to 14 inches. The question for us then is: By what means can our soils be made more drought-resistant, and to better retain the moisture without being what may be termed water-logged and sour? for it has been found that when water in a soil amounts to 80 per cent. or more of its water-holding capacity it is detrimental to the plants. Ordinary plants do best when the water in the soil amounts to from 40 to 60 per cent. of the water-holding capacity. The water-holding capacity of a soil is the amount of water that a given weight, say 100 lb., of the soil will contain when all the space between the grains of soil is filled with water. For example, a cubic foot of a very sandy soil has been found to contain about 40 per cent. by volume of air-space; when all this space is filled with water the sand will contain four-tenths of a cubic foot of water. A hundred pounds of such soil, when all the space between the grains is filled with water, contains about 20 lb. of water. In the same way wheat soil has been found to contain about 31½ lb. of water in every 100 lb. of the fully saturated soil. The amount of water in this soil most favourable to the growth of wheat is from 40 to 60 per cent. of 31½ lb., or from 12½ to 19 lb. per 100. The water-holding capacity of heavy clay soils is about 44·2 lb. of water in 100 lb. of saturated soil. The most favourable condition for plant growth in such soils is when they contain from 16 lb. to 24 lb. of water in 100 lb. of the saturated soil.

The water-holding power of soils has been given as follows:—

Sand	20 to 25 per cent.
Clay soil (60 per cent. clay)	40 per cent.
Clay soil (80 per cent. clay)	61 ,,
Pure grey clay	70 ,,
Loam	51 ,,
Garden mould	89 ,,
Humus	181 ,,

From the preceding table it will be seen that sand has the least and humus the greatest power of holding water, therefore it stands to reason that a soil well supplied with the latter is to be preferred to one containing a large percentage of the former. The question then comes to be: Do our soils contain humus sufficient to enable them to withstand protracted dry weather? In the newly-opened-up virgin soil the supply ought to be adequate, but of soils that have been in cultivation for years, under the continuous one-crop system so common in Queensland, the same cannot be said. The practice of continuous cropping without returning anything to the soil in the shape of organic matter is unquestionably ruinous. Do we not find in some of the older sugar-growing districts thousands of acres of land that was at one time under cultivation lying idle? And why? Has not the destruction of valuable organic matter, combined with continuous cropping, done much to bring about this state of matters? Not only that, but to-day there are hundreds of acres of land that will not yield a profitable return unless the rainfall is over the average and well distributed throughout the year. As the organic matter gets used up, so does the soil's power of conserving moisture get lowered, therefore it is to the farmers' interest to devise some means of keeping up the supply of humus. To some this necessity has already become apparent, for we find that a system of green manuring is finding a place among the crops grown on the farm.

The practice of green manuring is, perhaps, the cheapest and most speedy means a farmer can avail himself of, supplying both organic matter and plant food to the soil for the benefit of his crops.

Leguminous plants—that is, plants of the pea and bean family—are specially adapted for this purpose. They grow quickly, produce a large amount of organic matter, and are, moreover, a cheap means of enriching the soil in nitrogen. When only a limited time is available to grow the crop, the cow-pea, of which there are a large number of varieties to choose from, is the most suitable. I have known a crop of those ready for ploughing under between five and six weeks after sowing. Beans take longer to get to that stage, but this is oftentimes an advantage, for if the land is not immediately required they will keep it covered and the weeds in check for some considerable time without producing seed which would germinate and prove troublesome. I may, however, mention that one of the cow-peas can also claim this quality. This is the variety known as White's Perennial. In the tropical portion of the State it will, as its name implies, keep alive and grow for years, but I question whether it will withstand the cold and frost of the Southern parts. At Biggenden State Farm it has withstood the drought better than any other variety experimented with, and from past experience I have found that it seems to favour dry weather, and that continued wet is fatal to its growth.

Of the beans, the Small Mauritius variety has, so far, done best. It has, however, been found that a variety of cow-pea or bean, although doing well in one part of the State, does not do so well in another, consequently a farmer, before sowing on a large scale, would do well to make inquiry as to which variety would be most likely to prove suitable for his locality. Information on such points can be procured at any of the State farms.

Much can also be done in the way of keeping up the supply of humus by saving all stock manure, corn stalks, and other waste products of the farm, and returning them to the soil. This practice is said to be the backbone of old country farming, and it is astonishing that little or no provision is made to save more of this valuable material in Queensland, instead of letting it go to waste or destroying, as in the case of cane trash, by the application of the fire-stick. My advice to farmers, more especially small farmers, is: If you wish to render your soil more drought-resisting, and at the same time increase its fertility, save every scrap of organic material on the farm, and buy of your neighbour who does not appreciate its value. Moisture can, to a great extent, be conserved in the soil by practising deeper and more thorough cultivation. Many farmers only

cultivate to a depth of about 4 inches, and in soil of fair depth too. Sooner or later theirs will be the experience of many others. They will find out that mother-earth will not always smile when her back is scratched. Experiments have proved that subsoiling to a depth of 12 inches has conserved 128 tons of moisture per acre as compared with half that amount when only ploughed to a depth of 5 inches. The loosening up of the soil not only conserves the moisture, but also allows the roots of the plant to more freely extend themselves in their search after nourishment. In regard to shallow *versus* deep cultivation, an experiment on a small scale is being carried out at Biggenden State Farm. Half of one of the experiment plots was ploughed to a depth of 6 inches—the remaining part to a depth of 10. Across this area was planted a variety of crops, viz.—Arrowroots, ginger, sunflowers, castor-oil, &c. The smaller crops have not yet been harvested, but the outward appearance in favour of deep cultivation is very noticeable. On the sunflowers and castor-oil the difference was most marked; on the shallow cultivation the sunflowers were a complete failure, while on the more deeply worked soil they produced a fair crop.

As a simple and effective means of conserving moisture in the soil mulching is of the greatest importance. Mulching is the process of applying various substances as a covering for the soil over the roots of plants so as to prevent evaporation. This may be done by applying such substances as stable-yard manure, rotten straw, grass, weeds, cornstalks, or in fact anything of an organic nature. This mulch is, however, more applicable to fruit-trees and other permanent plants rather than to ordinary farm crops. In applying it to trees, avoid the too common error of piling it up in a heap close to the trunk. Spread it out at least as wide as the branches, out where the tips of the roots are, for it is there the moisture is absorbed. To lessen the chance of mould and fungus growth being bred in the material, shake it up now and again with a fork or hoe. In continued wet weather it is better to pull it to one side or spread it out altogether, as it might do harm in causing a fresh growth of roots near the surface. The easiest manufactured and most quickly applied mulch—the material for which is always at hand—is that formed by reducing the soil particles on the surface to a fine state of division, and so obtaining what is known as a dust mulch. This is without question one of the best means at the farmer's disposal to tide his crop over a dry period. During a drought nothing is more beneficial to the growing crop than a constant stirring of the surface soil, care being taken not to disturb or lacerate the roots. This is especially necessary after a shower, and every effort should be made, if dry weather is at all likely to supervene, to break up the crust that is sure to form as soon as the land is sufficiently dry to be worked with horses. Crops of maize, sugar-cane, &c., that would have been a complete failure if no attention had been paid to the conservation of moisture, have been successfully pulled through a drought by the simple means of "blanketing" the soil with a dust mulch.

Mr. Brooks sent two illustrations showing how the growth of castor-oil plants was improved by deep cultivation. They arrived, unfortunately, too late for reproduction with the above article.—Ed. *Q.A.J.*

HOW TO KEEP THE YOUNG PEOPLE ON THE FARM

was the subject of the following very sensible address given by Mr. W. Jamieson, M.P., at a meeting of one of the branches of the South Australian Bureau of Agriculture:—

"It is almost universally admitted that a very great many of our young people leave the farms when they become old enough to shift for themselves, and these are usually the most intelligent, active, and enterprising of our young people. They get away to Broken Hill, Westralia, or seek employment in

banks, shops, warehouses, factories, or try to secure Government billets of some kind—anything in preference to farm life. Why do they do this? Some say it is due to the succession of bad seasons and low prices for all kinds of farm produce; but, even without those causes, many hundreds would still have left their country homes. The fact is our young people develop quickly, and find farm life too slow. The glamour of the city and towns is attractive, and they think they will have short hours of labour, good pay for it, and no end of leisure and amusement. They are full of animal spirits, with robust health, and the staid older people are not always in sympathy with them, but expect their children to run in the same groove with themselves. How can this evil be remedied? A return of good seasons would induce some of the young people to stay on the farm, but this is not within the control of man, though it may be admitted that better crops and more payable results can be ensured in many cases by the adoption of a better system and cleaner and more rational methods in conducting work on the farm. Then parents are likely to fail in noting the advance in intellect and knowledge of their children. They treat them all along as children, and do not show sufficient sympathy with their ideas and aspirations. Why not give them a direct personal interest in the farm? Let them have a few acres to cultivate on their own account, let them rear a few animals for themselves, give them an insight into all the work of the farm, buy and sell a little in the market. If they make a bad bargain, show them in a kind and sympathetic way how they could have done better; if they make a good one, give them all the credit of their business ability. They should know the prices going for everything connected with the farm, the best kinds of implements and machinery, and the defects, if any, in certain kinds of implements, tools, animals. Let the young fellows have the best team and the best machinery to work with. It breaks a lad's heart to see the hired labourer driving the best team and using the best implements whilst he lags behind with the worst of everything. See that there is no scarcity of good books and papers, especially of the best upon farm work, poultry, horses, cattle, sheep, pigs, machinery, and the like. Above all, let the young people have young companionship, let them attend literary society meetings, institutes, &c. Give them reasonable time and opportunities for recreation, make the home as pleasant as it is possible to be, and if all this is done the city and towns will not possess the allurements that at present offer themselves to the fancy of the dull-living farm youngsters."

In discussion it was remarked that some farmers are too prone to cry "stinking fish" at home and abroad. There was no disputing the fact that there are long hours and hard work at some seasons, but there are times when it is possible to take it easy, to have a few days of leisure. Very few employees in towns can get away from their work; and, if they do get a little more money, they have to spend more in dress and for their keep. Farmers could not pay their sons and daughters such wages that they must pay to hired labourers; but although labourers on Government works got higher pay than on farms, yet with board and lodging added the labourer was better off on the farm than on the Government work. Still, the boys and girls should not be required to work Sundays and week days for their bare food and clothing. One member remarked that he did three times as much work as an ordinary labourer on the farm. Another said farmers' children sometimes are better educated than their parents, and may feel somewhat ashamed of the "rough-and-tumble" life at home. Efforts should be made to put a little more neatness and comfort in such homes. The Chairman was proud to be a farmer; life on the farm was being made easier day by day. There were seats on nearly every implement he used. He certainly thought that the parents were often to blame for the children wanting to leave the farm. Make the life more pleasant and easy for them. The farmer can take a holiday whenever he decides to do so. He has no master to control him. At one time every colonist was for going on to the land; now, from the talk, one would think they all wanted to leave it. With brains, improved machinery, and practice, and with the use of fertilisers the farmers

would be more prosperous, and this would attract people from the towns and keep the young people from wanting to leave the farms.

Mr. Jamieson, in reply, said—No true farmer ever cried down his occupation. The time has gone by for working incessantly during long hours. Farmers now use their brains and improved machinery. Some definite arrangement should be made to reward the young people for their labour. "Some day" is too far ahead.

BREEDERS' TABLE FOR SEPTEMBER, 1902—30 Days.

(From the *Live Stock Journal* Almanac.)

Day of Month.	Name of Animal, Hen, &c.	Date on which an Animal served or an Egg set on any day of the present Month is due to give Birth or Hatch.										Remarks.
		Mare, 48 weeks.	Cow, 40 weeks.	Ewe and Goat, 21 weeks.	Sow, 16 weeks.	Bitch, 9 weeks.	Goose and Rabbit 30 days.	Turkey, Duck, and Peafowl, 28 days.	Fowl, 21 days.	Pigeon, 18 days from last egg.	Canary, 13 days from steady sitting.	
		Aug.	June.	Jan.	Dec.	Nov.	Oct.	Sept.	Sept.	Sept.	Sept.	
1	...	2	8	27	21	2	1	29	22	19	14	
2	...	3	9	28	22	3	2	30	23	20	15	
3	...	4	10	29	23	4	3	Oct. 1	24	21	16	
4	...	5	11	30	24	5	4	2	25	22	17	
5	...	6	12	31	25	6	5	3	26	23	18	
6	...	7	13	Feb. 1	26	7	6	4	27	24	19	
7	...	8	14	2	27	8	7	5	28	25	20	
8	...	9	15	3	28	9	8	6	29	26	21	
9	...	10	16	4	29	10	9	7	30	27	22	
10	...	11	17	5	30	11	10	8	Oct. 1	28	23	
11	...	12	18	6	31	12	11	9	2	29	24	
12	...	13	19	7	Jan. 1	13	12	10	3	30	25	
13	...	14	20	8	2	14	13	11	4	Oct. 1	26	
14	...	15	21	9	3	15	14	12	5	2	27	
15	...	16	22	10	4	16	15	13	6	3	28	
16	...	17	23	11	5	17	16	14	7	4	29	
17	...	18	24	12	6	18	17	15	8	5	30	
18	...	19	25	13	7	19	18	16	9	6	Oct. 1	
19	...	20	26	14	8	20	19	17	10	7	2	
20	...	21	27	15	9	21	20	18	11	8	3	
21	...	22	28	16	10	22	21	19	12	9	4	
22	...	23	29	17	11	23	22	20	13	10	5	
23	...	24	30	18	12	24	23	21	14	11	6	
24	...	25	July. 1	19	13	25	24	22	15	12	7	
25	...	26	2	20	14	26	25	23	16	13	8	
26	...	27	3	21	15	27	26	24	17	14	9	
27	...	28	4	22	16	28	27	25	18	15	10	
28	...	29	5	23	17	29	28	26	19	16	11	
29	...	30	6	24	18	30	29	27	20	17	12	
30	...	31	7	25	19	Dec. 1	30	28	21	18	13	

BREEDER'S TABLE FOR OCTOBER, 1902—31 Days.

(From the *Live Stock Journal* Almanac.)

Day of Month.	Name of Animal, Hen, &c.	Date on which an Animal served or an Egg set on any day of the present Month is due to give Birth or Hatch.										Remarks.
		Mare, 48 weeks.	Cow, 40 weeks.	Ewe and Goat, 21 weeks.	Sow, 16 weeks.	Bitch, 9 weeks.	Goose and Rabbit 30 days.	Turkey, Duck, and Peafowl, 28 days.	Fowl, 21 days.	Pigeon, 18 days from last egg.	Canary, 13 days from steady sitting.	
1	...	Sept. 1	July. 8	Feb. 26	Jan. 20	Dec. 2	Oct. 31	Oct. 29	Oct. 22	Oct. 19	Oct. 14	
2	...	2	9	27	21	3	Nov. 1	30	23	20	15	
3	...	3	10	28	22	4	2	31	24	21	16	
4	...	4	11	Mar. 1	23	5	3	Nov. 1	25	22	17	
5	...	5	12	2	24	6	4	2	26	23	18	
6	...	6	13	3	25	7	5	3	27	24	19	
7	...	7	14	4	26	8	6	4	28	25	20	
8	...	8	15	5	27	9	7	5	29	26	21	
9	..	9	16	6	28	10	8	6	30	27	22	
10	...	10	17	7	29	11	9	7	31	28	23	
11	...	11	18	8	30	12	10	8	Nov. 1	29	24	
12	...	12	19	9	31	13	11	9	2	30	25	
13	...	13	20	10	Feb. 1	14	12	10	3	31	26	
14	...	14	21	11	2	15	13	11	4	Nov. 1	27	
15	...	15	22	12	3	16	14	12	5	2	28	
16	...	16	23	13	4	17	15	13	6	3	29	
17	...	17	24	14	5	18	16	14	7	4	30	
18	...	18	25	15	6	19	17	15	8	5	31	
19	...	19	26	16	7	20	18	16	9	6	Nov. 1	
20	...	20	27	17	8	21	19	17	10	7	2	
21	...	21	28	18	9	22	20	18	11	8	3	
22	...	22	29	19	10	23	21	19	12	9	4	
23	...	23	30	20	11	24	22	20	13	10	5	
24	...	24	31	21	12	25	23	21	14	11	6	
25	...	25	Aug. 1	22	13	26	24	22	15	12	7	
26	...	26	2	23	14	27	25	23	16	13	8	
27	...	27	3	24	15	28	26	24	17	14	9	
28	...	28	4	25	16	29	27	25	18	15	10	
29	...	29	5	26	17	30	28	26	19	16	11	
30	...	30	6	27	18	31	29	27	20	17	12	
31	...	Oct. 1	7	28	19	Jan. 1	30	28	21	18	13	

LIQUID MANURES.

Sulphate of Ammonia.—Half oz. to 1 oz. per gallon of water. This should not be mixed with lime, nor should it be applied to soils recently limed.

Fresh Urine is a forcing manure very valuable as a nitrogenous fertiliser.

Oil Cake stirred into a tank containing a mixture of dung and water. Leave the mixture to itself for three or four weeks to undergo fermentation.

Dairying.

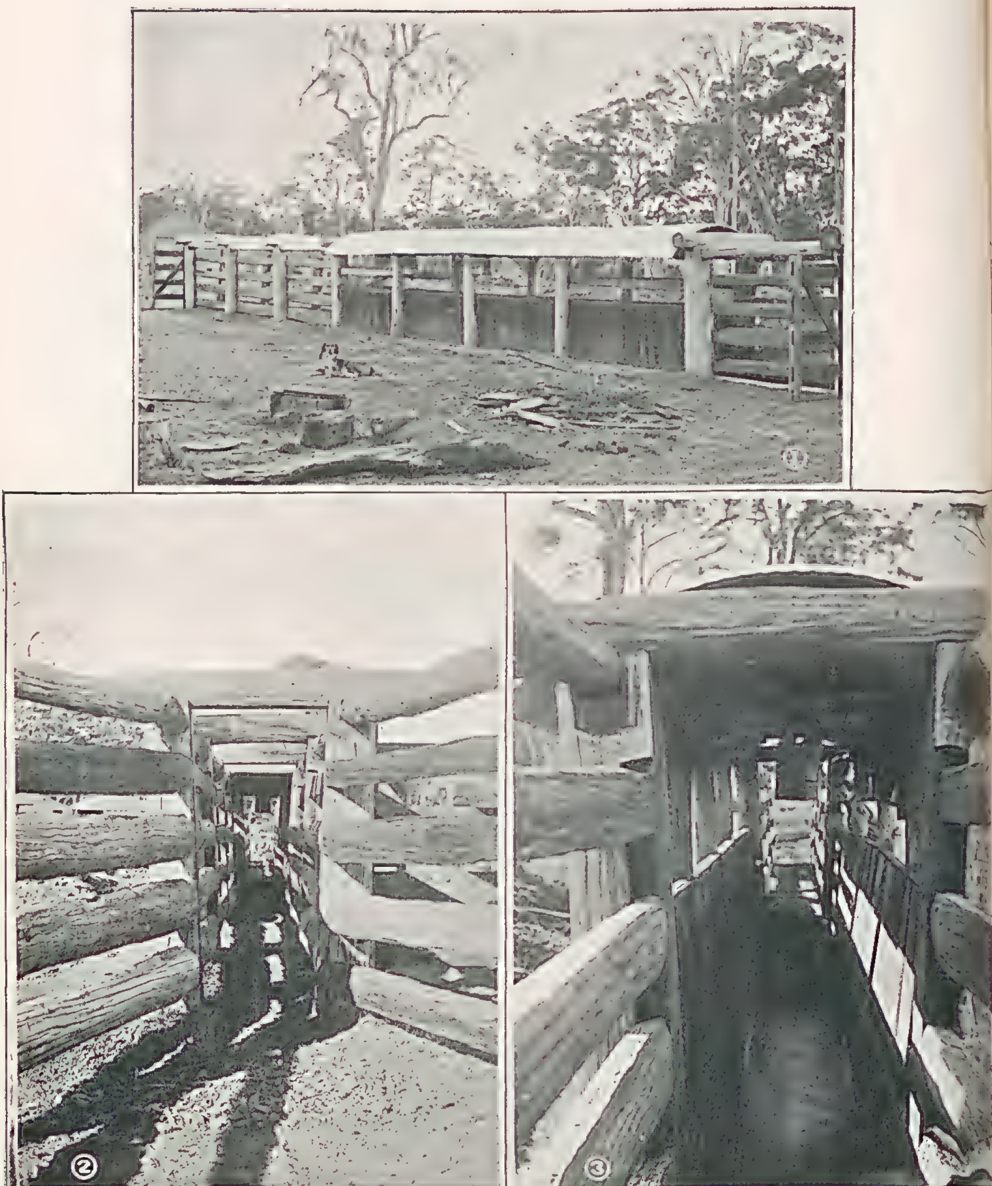
THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST MAY, 1902.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Amy ...	Ayrshire	7 Nov., 1901	345	3·7	14·29	
Isabelle ...	,, ...	7 Sept. ,,	85	4·4	4·18	Dry, 6-5-02
Jeannie ...	,, ...	7 Oct. ,,	310	4·2	14·58	
Linnet ...	,, ...	7 May ,,	102	4·5	5·14	Dry, 21-5-02
Lavina ...	,, ...	11 Sept. ,,	205	4·1	9·41	Dry, 30-5-02
Lass ...	,, ...	24 Aug. ,,	80	4·0	3·5	Dry, 7-5-02
Lena ..	,, ...	3 Dec. ,,	402	3·7	16·65	
Lowla ...	,, ...	3 Dec. ,,	314	3·7	13·01	
Rosebud ...	,, ...	13 Nov. ,,	442	3·8	18·81	
Ruth ...	,, ...	12 Dec. ,,	312	3·7	12·92	
ReamRouthie	,, ...	13 Dec. ,,	427	3·7	17·69	
Leesome ...	,, ...	15 Jan., 1902	588	3·7	24·36	
Lonesome ...	,, ...	22 Jan. ,,	256	4·4	12·61	With first calf
Renown ...	,, ...	22 April ,,	603	3·6	24·31	
Blink ...	,, ...	28 April ,,	687	3·7	28·46	
Bonny ...	,, ...	15 May ,,	140	3·7	5·80	
Realm ...	,, ...	17 May ,,	112	3·5	4·39	With first calf
Molly ...	Grade Ayrshire...	5 Oct., 1901	333	3·8	14·17	
Bell ...	Jersey	15 Sept. ,,	82	5·0	4·5	Dry, 14-5-02
Carrie ...	,, ...	31 Aug. ,,	98	5·4	5·92	Dry, 14-5-02
Effie ...	,, ...	18 Nov. ,,	275	4·2	12·93	
Evileen ...	,, ...	2 Sept ,,	65	5·0	3·6	Dry, 10-5-02
Ivy ...	,, ...	24 Oct. ,,	94	5·2	5·47	Dry, 16-5-02
Spec ...	,, ...	27 Aug. ,,	128	4·8	6·88	Dry, 30-5-02
Tiny ...	,, ...	5 Oct. ,,	42	5·1	2·39	Dry, 7-5-02
Jersey Belle	,, ...	17 Jan., 1902	366	4·5	18·44	
Stumpy ...	,, ...	17 Mar. ,,	637	4·8	34·24	
Pansy ...	Grade Jersey ...	28 Oct., 1901	204	4·5	10·28	Dry, 30-5-02
Countess ..	Shorthorn ...	18 June ,,	72	4·0	3·2	Dry, 6-5-02
Empress ...	,, ...	27 Dec. ,,	223	3·6	8·99	
Frizzy ...	,, ...	29 Nov. ,,	472	3·8	20·08	
Lady Vixen	,, ...	13 July ,,	287	3·7	11·89	With first calf
Kit ...	,, ...	14 Jan., 1902	541	3·8	23·02	
Louisa ...	,, ...	23 Dec., 1901	473	3·7	19·6	
Violet ...	,, ...	20 Jan., 1902	490	3·6	19·75	
Curly ...	,, ...	12 Nov., 1901	447	3·6	18·02	
Esma ...	Grade Shorthorn	29 Nov. ,,	264	3·6	10·64	With first calf
Dora ...	,, ,, ...	18 May, 1902	102	3·7	4·22	With first calf
Restless ...	,, ,, ...	16 Mar. ,,	472	3·8	20·08	
Eva ...	,, ,, ...	26 Oct., 1901	181	4·0	8·10	Dry, 27-5-02
Leopard ...	,, ,, ...	6 Oct. ,,	147	4·0	6·58	Dry, 27-5-02
Peggie ...	,, ,, ...	19 April, 1902	494	3·8	21·02	
Russet ...	,, ,, ...	25 Dec., 1901	203	3·8	8·63	
Stranger ...	,, ,, ...	6 Nov. ,,	387	3·7	16·03	
Alice ...	,, ,, ...	18 Jan., 1902	428	3·6	17·25	
Poly Red ...	,, ,, ...	3 Jan. ,,	373	3·7	15·45	
Rosella ...	,, ,, ...	18 Jan. ,,	544	3·6	21·93	
Rowly ...	,, ,, ...	22 April ,,	455	3·8	19·37	With first calf
Lilly ...	,, ,, ...	22 Feb. ,,	427	3·5	16·73	With first calf
Catch ...	,, ,, ...	13 Feb. ,,	316	3·5	12·38	With first calf
Haze ...	,, ,, ...	11 Feb. ,,	354	3·6	14·27	With first calf
Reannie ...	Holstein Sh'rth'rn	7 Mar. ,,	582	3·4	22·16	With first calf
Angel ...	Holstein Devon...	5 Dec., 1901	326	3·6	13·14	With first calf
Damsel ...	Holstein	16 Jan., 1902	571	3·3	21·10	
Ada ...	South Coast ...	16 July, 1901	157	4·4	7·73	Dry, 30-5-02
Topsy ...	,, ,, ...	4 Oct. ,,	384	4·0	17·20	
Fancy ...	,, ,, ...	19 Jan., 1902	578	3·7	23·95	
Lady Rose ...	Guernsey ...	26 Feb. ,,	345	4·2	16·22	
Plover ...	Shorthorn ...	7 Feb. ,,	438	3·6	17·36	

Plate VI.



A Model Cattle Dip.

CATTLE DIP.

The following formula of a dip for the destruction of cattle ticks has been adopted by the Stock Department. It will be recognised as the Departmental Dip:—

Arsenic	8 lb.
Caustic soda	$4\frac{1}{2}$ „
Tallow	8 „
Best Stockholm tar	$2\frac{1}{2}$ gallons
Water	400 „

Directions for Preparation of Dip from the above Medicaments.

(*a*.) Half fill with water a 5-gallon drum, add 2 lb. of caustic soda, and boil; then add slowly 8 lb. arsenic. Add cold water in small quantities to prevent overboiling until drum is full.

(*b*.) Boil 100 gallons of water in a 400-gallon tank; add $2\frac{1}{2}$ lb. of caustic soda, then 8 lb. of tallow, and boil quickly. Add slowly in a thin stream $2\frac{1}{2}$ gallons of Stockholm tar. When the whole of the tar has been added, boil from thirty to forty minutes, then add the solution prepared in accordance with instructions in (*a*); gradually fill the tank with water and keep the mixture boiling until the tank is filled.

A MODEL CATTLE-DIP.

The illustrations herewith, taken by Mr. E. P. Dyball, afford excellent representations of his brother's (W. H. Dyball's) cattle-dip, on his dairy farm, Greenbank, Yandaran, near Bundaberg.

It is built after the plans of those supplied by the Department—that is, so far as the cement pit is concerned; but Mr. Dyball thinks they have improved on it in the matter of the draining-yard, more especially for dairymen, viz.:—Instead of an enclosed square or triangle yard, they have made a long cement bottom crush, and consider that by the time the cattle walk through it they have drained sufficiently, and will thus cause no stoppage, but can go through in one continued string, without the horning, &c., they are subjected to in a small yard, which is a great consideration with milkers.

There is a great difference of opinion regarding the proper position of the water and the "get-in" lip of dip. In Messrs. Dyball's opinion, the fluid should be about 8 inches below the end of lip, so that the beast can see that it has to jump; otherwise, if the water is above the lip, it deceives them, and often causes accidents to their legs, or they turn a complete somersault. They have put through several hundred cattle and horses now, and have had no mishap.

Anyone wishing for more detailed account of the above dip, I should be most happy to give them.

No. 1.—Shows view of dip.

No. 2.—Entrance to crush.

No. 3.—Taken from inside exit crush, or draining place, and shows some of the workmanship of the builder.

The diagram shows the ground plan of the dip.

UTILISATION OF SKIM MILK.

The United States Consul at Gothenburg (Germany) reports that Dr. M. Ekenburg, of that city, has invented an apparatus by which milk can be reduced to a powder, like flour in appearance, but possessing all the qualities of milk in concentrated form, moisture excepted. This milk flour is said to be completely soluble in water, and can be used for all purposes for which common milk is employed. It is claimed that it does not get sour or ferment, and that it can be kept and transported in tin cans, barrels, bags, &c. The inventor estimates the cost of production at little more than 1s. per 100 quarts, and thinks that milk flour from skim milk can be sold for about 6½d. per lb. The invention is considered to be mainly of importance for the utilisation of skim milk, much of which has hitherto been wasted, but which can in the dry form be easily transported without loss of quality.

NEW PROCESS OF PRESERVING BUTTER.

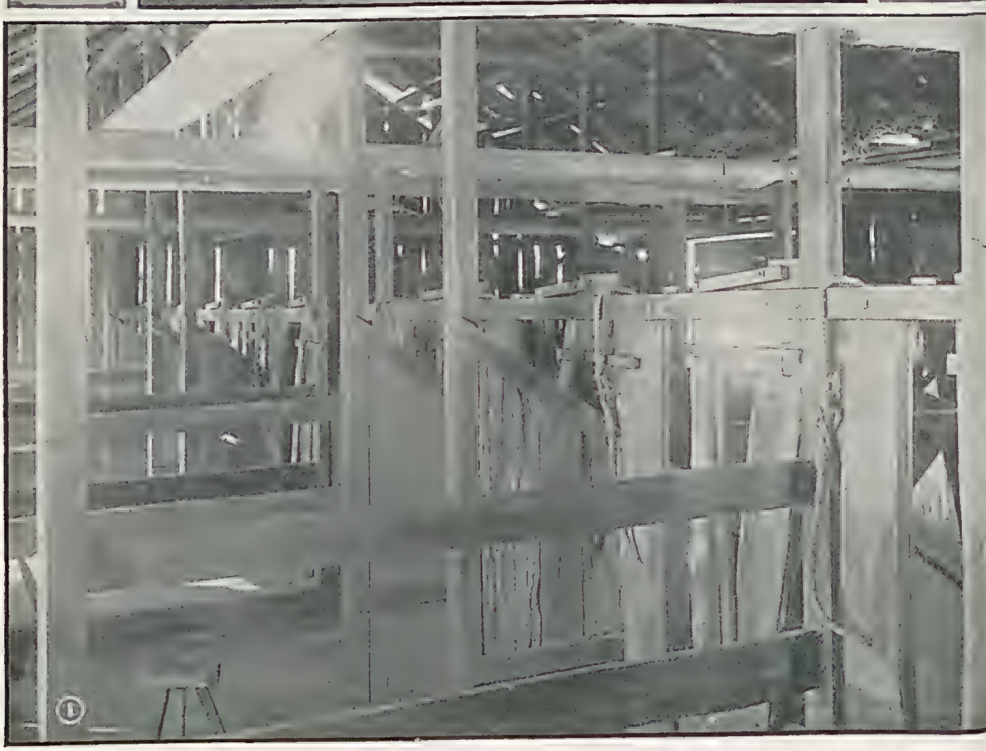
The researches of Fehling have established that gum-arabic and its concentrated solution are not fermentable. Emile de Meulemeester, of Brussels, Belgium, has found (says the *Scientific American*), by numerous experiments that, by mixing powdered gum-arabic with butter in the requisite proportions for absorbing water, the butter can be kept for a long period without becoming rancid. If a small quantity of salt be added, the butter will preserve its aroma. This method of procedure is objectionable, because it requires too large a proportion of gum-arabic, and because the gum should be free from impurities. It is difficult to preserve pure gum in large quantities, and its price would speedily become prohibitive if the consumption were large. In order to obviate these disadvantages, M. de Meulemeester proceeds in the following manner:—

Raw gum-arabic is dissolved in water, and the solution filtered to remove the impurities. The filtered solution is then mixed with the butter, and the excess of liquid contained in the mixture is finally extracted.

SIBERIAN BUTTER.

At the Agricultural Conference in June last at Toowoomba, Mr. John Reid mentioned the fact that Siberia was likely to enter into competition with Queensland in the export of butter. The great majority of us have been brought up in the belief that Siberia is a dreary waste of perpetual snow and ice, where unfortunate Russian exiles drag out a wretched existence in a rigorous Arctic climate. What are the facts, however? To begin with, although the winter lasts from November to March, the country enjoys a warm summer, many days being absolutely tropical in heat. There are enormous forests of oaks, larches, maples, pines, silver firs, &c. The berry-yielding plants are everywhere to be found in the woods. All the open spaces east of the Altai and right up to the Stanovoyi Mountains are seas of splendid grass in spring. There are lovely prairies abounding in wild flowers and nutritious herbs. The upper portion of the Yenesei River is called the Italy of Siberia, and practically the whole district between the 60th parallel of north latitude and the Chinese frontier and bordering on Manchuria abounds with vast fertile plains where agriculture and dairying are now carried on with marked success. In the Tobol and Ishim regions, which cover 330,000 square miles, there are probably from 10,000,000 to 12,000,000 acres under wheat, oats, rye, potatoes. In one district of 45,000 inhabitants there is one acre under cultivation for each person. There are almost as many sheep, cattle, and horses in the Ob and Ishim district as there are in Queensland. In 1894 only 400 lb. of butter were exported; in 1901 the export increased to 2,200,000 lb., and the Russian Government is doing all it can to foster the dairying industry, and to encourage exports to Europe by means of the newly-completed West Siberian Railway.

Plate VII.



1.—Interior of Milking Shed. 4.—Blacksmith's Shop.

DAIRY FARMING AT STRATHPINE.

TO TALK about dairy farming as it is perforce carried on during the present disastrous drought, is to talk about something which practically is at a complete standstill. Throughout the coast lands, except in the extreme North, the same dreary conditions of absence of fodder for the cattle may be observed. Wherever the unfortunate dairy cows are dragging out a pitiful existence, it is solely by the strenuous exertions of the farmers to provide fodder in some shape or form that they are kept alive. This fodder takes the form of materials which in prosperous times are looked upon as only fit to be burned or at best to be turned into manure. We hear of even sawdust mixed with molasses being utilised, certainly not for milk production, but to distend the stomachs of valuable cattle with something solid, by which the gnawing pangs of hunger may be assuaged.

We lately paid a visit to the farm of the Messrs. Skerman Brothers, at Harrison's Pocket, 6 miles from Strathpine, on the North Coast line. The township is prettily situated on the railway line, and in seasons of normal rainfall presents a picture of the rural beauty common to many of the townships in this portion and in many others also of the State. At present, however, it shares the common desolation due to the drought. Nowhere is there a sign of bush vegetation, and only a miserable remnant of what should be luxuriant lucerne and corn fields. Accompanied by the artist to the Department of Agriculture, Mr. H. Mobsby, I journeyed to Strathpine, where we were met by Mr. P. Skerman, whose farm we proposed to visit. Notwithstanding the late rains, the road to the farm was dry and even, and in excellent order for a cyclist. The country is densely timbered with gum, ironbark, and peppermint trees, with, in places, a dense undergrowth of young box and other saplings, but there was no sign of other vegetation until we approached the farm, when a decided spring in the grass appeared due to the late casual showers. Should further rains be experienced, it will not be long before the whole of this portion of the district will once more put on its pristine verdant garb and the cattle their wonted sleek appearance.

Our hosts were three brothers, all mechanics. It has been said that an engineer, blacksmith, or carpenter cannot be converted into a successful farmer. Against this, we may instance the case of a Queensland engine-driver who, on retiring from active railway work, became one of the most successful farmers in the Gatton district. It may certainly be said that the Skerman brothers are going the right way to prove that common sense, intelligence, and observation are very certain roads to success. They hold 320 acres of good grazing country, very heavily timbered, but also containing some excellent scrub land long since cleared and under cultivation, whilst on the ridges there are considerable areas of rich chocolate soil of great depth, admirably adapted to the growth of fodder crops—crops which are essential to them for their purpose, which is to establish a thoroughly up-to-date dairy farm.

This idea is being carried out in a very systematic manner, aided by all sorts of mechanical labour-saving appliances, which their scientific training enables them to apply to the best advantage.

At present they are only milking about twenty-four cows, and, as may be imagined, the milk yield, under present circumstances, is very limited. So far the main product of the dairy has been cheese, but as soon as the drought breaks up it is proposed to produce cream on a large scale, which will be sent to a neighbouring butter factory. The milking-shed (Fig. 1) is admirably constructed, and although Mr. Skerman has never seen the milking-shed at the

Agricultural College at Gatton, yet his own differs very little from it even to the exit and entrance gates, which are precisely similar to those at the College. Twenty-four cows can be accommodated in this shed, where everything is arranged for their comfort and for the convenience of the attendants.

The stalls run down the centre of the building, and at intervals there are partitions between which three cows have ample room to lie in comfort when housed. The whole of the ground floor is cemented, and slopes imperceptibly to either side, thus allowing all liquid matter to flow into a shallow bevelled-off drain, whence it passes through pipes to the outside of the building, where a box drain will convey it to a tank alongside the manure pit. The usual bails, three in number, occupy each of the eight compartments.

In order to prevent the cows pushing their heads through the bails when not being fed in the bins which run from end to end of the shed, a simple mechanical appliance, which works simultaneously with the motion of the bails, opposes a barrier to the cow's wily attempts. A short rope with an eye and a toggle is placed round the cow's neck, and is just sufficiently short to prevent her passing her head round into her neighbour's stall, whilst it is long enough to allow her to lie down in comfort and even to turn half round. Few of the cows require to be leg-roped, but where this is necessary a remarkable style of leg-roping is adopted. Instead of one leg being hauled back by the rope, both legs are fastened by a peculiar hitch just above the hock. By this arrangement it is impossible for the cow to kick or to switch her tail, which is securely fastened by the rope. All the animal can do, if inclined to resent this confinement, is to buck, but the bucking is of short duration and seldom occurs a second time. When the cows are milked, the milk is poured into cans which stand on recesses constructed at intervals in the walls of the building. A wooden tramline runs down the whole length of the stalls, by which the chaffed fodder is conveyed to the feeding troughs Overhead is a flooring laid on the tie-beams on which some twenty bales of chaff can be stored. There are six wide doors to the building running in grooves instead of opening on hinges, thus avoiding the slamming of doors during a high wind and the consequent damage to hinges and doors.

Everywhere the most scrupulous attention is paid to cleanliness, and, as the whole place can be washed down by gravitation, the minimum of hand labour is required. The entrance and exit gates are so arranged that the cows after being milked pass out at a gate opposite to the one they entered by, and they remain in a yard separate from that in which the as yet unmilked cows are awaiting their turn.

As far as fodder is concerned, the animals are now on what Mr. Skerman calls "Soldiers' Rations"—*i.e.*, rather rough and limited in quantity. Still, there is yet a couple of months' supply of good oaten hay in the barn, besides a quantity of dry corn stalks and husks which, when chaffed and damped, afford a considerable amount of nutriment, and are eaten with avidity by both cows and horses.

These materials are chaffed by means of a two-horse chaffcutter capable of chaffing 3 tons daily. When crops are plentiful, the lucerne and oaten chaff are pressed into 300-cwt. bales. The bales are placed in a sunken frame; the chaff is shovelled into them and pressed as closely as possible. Then a pulley is brought into play through which passes a rope to which are attached four hooks. The hooks are stuck into the bale; a horse is hitched on to the other end of the rope, and he lifts up the full bale, which is sewn up, hooked on to another rope, and raised at once on to a wagon (Fig. 2). There is no lifting to be done by anyone engaged in the work.

In connection with harvesting the corn crop, another device is employed.

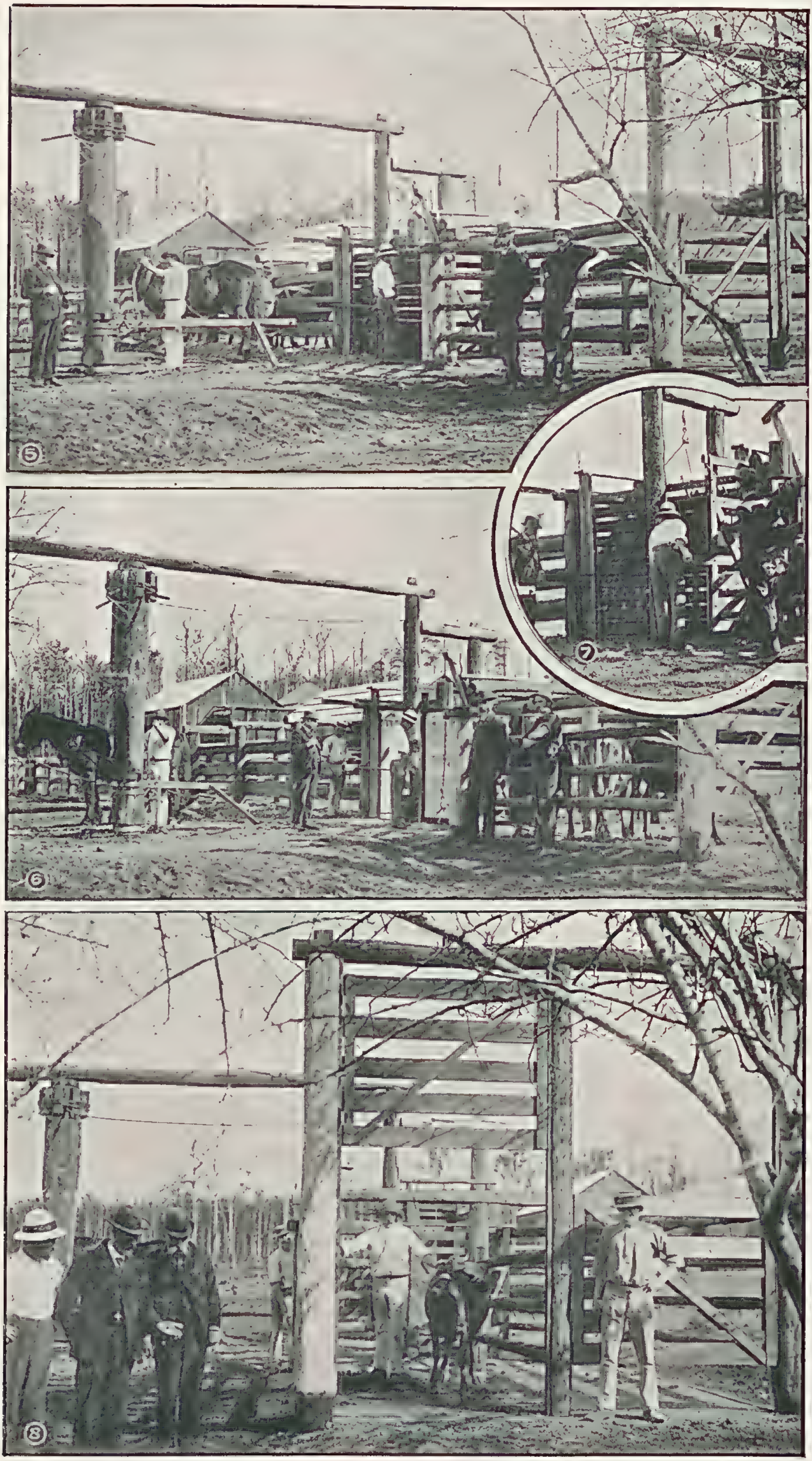
As cornstalks will henceforth be considered of more value as fodder than as rubbish to be burnt, the whole crop will be stooked.

We here give an illustration (Fig. 3) of a very simple but effective appliance by which the stooks are rapidly and firmly built.

Plate VIII

2.—Cutting and Loading Chaff. .—Corn Stooker. 9, 10, and 11.—Patent Road Gate.

Plate IX.



Cage Cattle Dip.

The cornstalks with the cobs attached are placed in a slanting position, leaning against each other in the four angles formed by the beam and cross bar shown in the diagram. A simple iron winch has a half-inch rope attached to it, which rope passes through a hole at one end of a piece of 3 by 1 inch batten, and is made fast to the other end. When sufficient stalks are piled against each other pyramid-fashion, the rope is passed round them, and the winch is turned, winding up the slack of the rope till the stalks are firmly squeezed together. The top of the stook is then secured with a piece of cord, the winch is slacked off, the cross bar and beam (which is also a 3 by 2 inch batten) are withdrawn, and the stook stands firm and solid defying the entrance of rain water.

Within the spacious barn is the framework of a silo calculated to hold about 60 tons of silage. This will shortly be completed, and a carrier will be attached to the chaffcutter, by which the material to be ensilaged will be conveyed to the top of the silo. A further improvement is contemplated, which is to run an overhead frame trolly which will at one lift unload the contents of a wagon and place the load in the most convenient position for chaffing. The doors of the barn, like those of the cowshed, run on iron castors in grooves, and the openings are wide enough to admit a wagon drawn by two horses. The wooden tramway from the milking-shed brings the trolly right up to the barn door, where it is loaded straight from the chaffcutter. Leaving the barn with its ingenious appliances, we proceed to the blacksmith's shop (Fig. 4), which is a neat iron structure, replete with all the requisites for making horse-shoes and such other iron work as is required on the farm. A boring machine is driven by a horse gear near the entrance—another saving of hand labour.

Here are being executed several orders for the machinery of a patent connected with a dip which has been constructed on the farm.

This dip is called a "Cage Dip" (Fig. 5), and although there are other cage dips in one or two districts, yet the arrangements in connection with that of the Messrs. Skerman are so perfect as to merit for it almost the claim to its being an invention, which, however, those gentlemen distinctly disclaim. The only invention about it is the appliance for lowering and raising the cage, which appliance has been patented. So well does it work that half-a-dozen orders have been given for the manufacture of the apparatus, and these orders, as stated, are being now executed on the spot.

We will try and describe the dip, cage, and appliances.

In the first place, there is a yard leading to a gradually narrowing crush. At the end of the crush is the dip pit. On either side of the pit are two sliding doors shown in the picture, and over the fluid hangs the cage, which is somewhat like a barred horse box. Near the top of the cage is a grating, which can be raised or lowered. This grating prevents a beast raising its head above the fluid.

The cage floor when raised is exactly on a level with the floor of the crush on one side and with the dripping floor on the other. The cage itself is suspended from a rope leading to the capstan, by which it is raised after immersion. As the beasts come down the crush one by one (it is too narrow for them to pass each other or to turn round), the first one steps fearlessly on to the cage floor, and the door immediately closes behind it. It cannot pass out at the other end as the exit is also blocked by the second door. As soon as the cow is in the cage the patent brake is touched, and the cage descends gently until the overhead grating is submerged (Figs. 6 and 7), when it is at once brought up to the surface by means of the capstan, worked by a horse. The back door is opened, and the cow walks out into the dripping-pen. There are two of these pens, each capable of holding ten cows. They are left there until the last one has been dripping for ten minutes, when they are released. Meanwhile the second pen is brought into requisition, ten minutes being allowed for dripping, and so on till the herd has all been through. The exit gates (Fig. 8) from these pens are opened by means of heavy counterpoises attached to cords passing overhead over pulleys, which raise the gates by a slight downward pull by the attendant.

The dripping-pens are connected with a slight slope, and the fluid from the animals' hides passes through a pipe on either side into a barrel sunk in the ground, whence it is returned to the pit. So gently does this dip work that it should be of inestimable value for the purpose of dipping cows or mares in calf or foal. There is no tremendous head-over-heels plunge to take, and no danger of hurting the weakest or the most powerful animal. Should anything go wrong with the capstan—such as a horse jibbing—one man can easily push the bar round and raise the cage; and, in the event of a rope breaking, two men can lift cage and beast above the water—indeed, Mr. J. Skerman lifted it from the bottom single-handed. As for the patent brake (A in Fig. 5), it is so simple and yet so strongly constructed that its going out of order seems to belong to the impossibilities.

We do not propose to describe this brake, as it is Mr. Skerman's patent, and is as yet only patented, as stated, in Queensland and New South Wales, although steps have already been taken to protect the patent rights in the rest of the States of the Commonwealth and in New Zealand. Further improvements are to be made in the capstan. At present it consists of a tall central post (Fig. 5), near the foot of which is attached a walking-beam for horse-power and the brake, whilst the rope for lowering and raising the cage passes high overhead. In the new scheme the high capstan will be done away with, and the raising and lowering appliances will lead from the head of the cage over a pulley down to another pulley near the ground and thence to the brake.

Considerable expense will thus be avoided. The work of dipping is so expeditiously carried out that only one minute is required after the animal is in the cage to submerge and raise it and let the cow out. With tractable animals used to being dipped they can be passed through at the rate of two per minute.

The total cost of dip, cage, capstan, and brake, with all sawn timber supplied for gates, &c., is about £30, which can be reduced to £26. The Messrs. Skerman contract to construct their dip at the former price, but if board and lodging and occasional assistance are furnished by the person for whom the dip is being constructed, the lesser price would cover the cost, with the exception of the split timber for yards and crush.

Not far from the cowshed is the manure pit, or paddock, rather. There again we find things so managed as to save labour. The manure pit is an enclosure of posts, rails, and upright slabs. In front and on an incline are sliprails Loose palings are placed upright against the rails inside. The manure is wheeled up a wooden inclined plane and tipped into the enclosure. When it is desired to cart it away to the field, the sliprails are taken down, the palings fall outward and are put aside. Then the manure is quickly shovelled into the carts and the railings and palings are replaced.

Amongst the mechanical contrivances on this farm, there is one well worthy of notice. This is a gate crossing the road at the entrance to the property. We give here some illustrations of the contrivance, which almost explain themselves (Figs. 9, 10, and 11.)

The gate is not one of Mr. Skerman's inventions. It is an adaptation of a similar contrivance which he noticed when on a visit to another district.

The gate proper consists simply of two uprights and three horizontal bars of hardwood bolted together. On one side of the road are two ordinary round posts, between which is a square block on which the gate-stud rests when the gate is closed. On the right-hand side are two posts about 10 feet high, leaning outward, and connected at the top by a cross-piece bolted to them. At each end of this cross-piece an iron strap is bolted on, through which passes a sapling about 14 feet long. The sapling is suspended at a point some 18 inches from the butt. At this butt an iron rod is fixed, with its lower end attached to the gate. Two pairs of stout battens are attached, one pair to the central upright of the gate, and working on a pivot in a block near the ground inside the posts; the other pair are attached to the second upright from the right, and working on a pivot outside the posts. A rope depends from the end

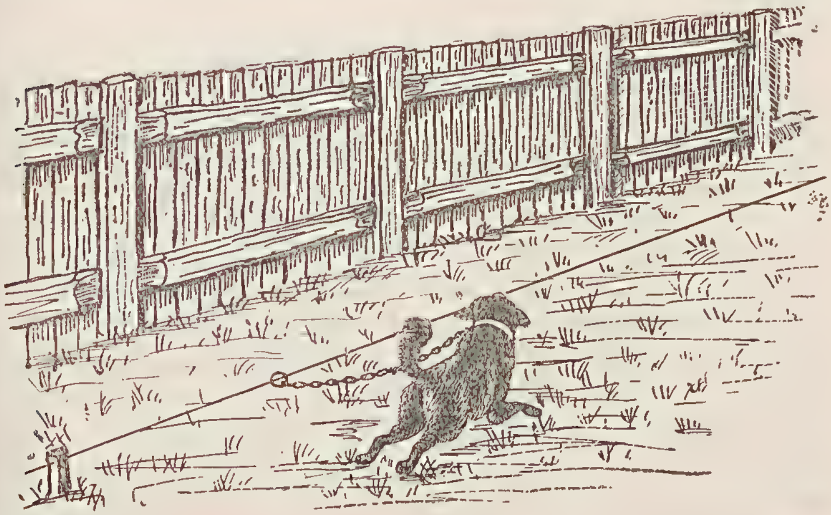
of each sapling. When the rope is hauled down, the gate rises from the blocks and begins to run back by the working of the pivoted battens. When half through the right-hand posts it falls back by its own weight, and rests on a block fixed in the ground at the distance of its own length from the roadway. The gate is now open. To close it, it is merely necessary to seize the rope on the opposite side and haul down on it, when the gate again rises and falls across the road. There is no need of great strength—a girl can operate the gear. The great advantage gained is, that when a traveller arrives, either on horseback or in a vehicle, he need not stop. All he has to do is, in passing, to pull on the rope and at once let go. The gate falls back and allows him to get clear before he reaches the closing rope, which he hauls on without stopping, and the gate returns to its original position, closing the road.

To illustrate this, one of Mr. Skerman's brothers, a Mounted Infantry man in full uniform, galloped up to the gate, seized the rope, opened the gate, and, without breaking his pace, closed it behind him. An attempt to do this on a bicycle, however, ended in failure. Such a contrivance is very welcome when roads are ankle-deep in mud, and when the driver of a vehicle would have to get down to open and close his gate.

Here, for the present, we will close our account of this very interesting farm. By and by, however, there will be a number of improvements made—such as a new dairy, an engine for driving the separator, a tramway from the dairy to the cowsheds, and a variety of other conveniences which, when completed, will result in this farm being the show one of the district. We need scarcely state that the proverbial Australian hospitality was bestowed upon us by Mrs. Skerman and her amiable family.

HOW TO TETHER A WATCHDOG IN A FIELD.

Whenever it is found necessary to guard a small field from depredators, such as wallabies, bandicoots, or even human plunderers, it is a good plan to stretch a running wire alongside it inside the fence. The dog's chain is fastened



to this by a loose ring. The dog can run the whole length of this wire, and this gives him a long range and an appearance of freedom which will drive off wild animals and other evil-doers.

Poultry.

For the information of a correspondent, the poultry expert at the College writes:—

GEESE.

The Toulouse and the Embden geese are the most popular in this country. The former is slightly the better layer, but is not a good sitter: the latter mature more quickly, and are earlier ready for market. For market purposes, a cross between the two makes a large and quickly maturing bird.

The infertility of your eggs may be due to the gander being too fat, or having too many geese with him (three are sufficient), or it may be that the gander only mates with one goose (this does occur sometimes) and takes no notice of the others. One marked characteristic of the gander is that in a wild state he is strictly monogamous, but when domesticated ceases to be so: this trait, though generally latent, is sometimes the cause of infertile eggs.

Breed only from birds turned two years old, collect the eggs every day and set them under large hens; do not let the goose sit on the first batch she lays; shut her up to break her off her broodiness, and she will soon lay another batch. It is advisable, however, to let her sit after the second batch; have the eggs as fresh as possible, and soak the ground where the nest is made well with water, as geese require far more moisture for their eggs than hens do. If you let the goose sit do not disturb her, or you will make her savage, and she might break her eggs.

Keep the goslings in the nest for thirty-six hours after hatching, as they want heat more than food at that time. After twenty-six hours give them hard-boiled eggs, with bread crumbs, pollard, and a little meat. Coop them if possible on a nice young patch of grass, as after the first few days they live principally on grass, and only require a little grain at night and a dry straw bed to keep them warm. Keep them out of deep water while they are young. Use a drinking fountain that they cannot get into. Shade them from the sun, as they are like ducks and cannot stand it.

POULTRY TICKS.

In reply to a suggestion by a member of the Wilson Branch of the Bureau of Agriculture of South Australia, as to the prevention of the terrible poultry tick pest, the general secretary advised building the fowlhouse of galvanised iron, with all the framework outside. Sling the perches by wire from the roof, and fix kerosene tick traps on to the perches. This tick trap is thus described by Mr. E. H. Messenger, of the Davenport Branch:—"It consists of a piece of $\frac{3}{16}$-inch wire a foot long, hooked over $1\frac{1}{2}$ inches at the top end, and furnished with thread and nut at the bottom. A cone of galvanised iron $1\frac{1}{2}$ inches across at top and $1\frac{1}{2}$ inches deep is soldered on the wire at $4\frac{1}{2}$ inches from the bottom, and in this the kerosene is placed. At $5\frac{3}{4}$ inches above the bottom of the wire a ruve or ring is soldered on the wire, to support an umbrella-shaped piece of galvanised iron, $2\frac{1}{2}$ inches across, above the kerosene cone, to keep anything from falling into the kerosene. One of these traps is to be affixed to each end of a free perch by aid of the nut and screw, and the perch is then to be slung to the rafters with wire. One is described in present issue in report of Davenport Branch. Or use Mr. Pybus's tick puzzler. If ticks get into the house, remove the perches, place a lot of straw inside the house and set fire to it. The iron will become so hot that neither ticks nor their eggs can resist, and the house will again be clean. Dip each fowl in a cold bath made by boiling two sticks of twist tobacco in a gallon of water for ten minutes, with stirring. That will kill the ticks on them. Do not put their heads in the dip."

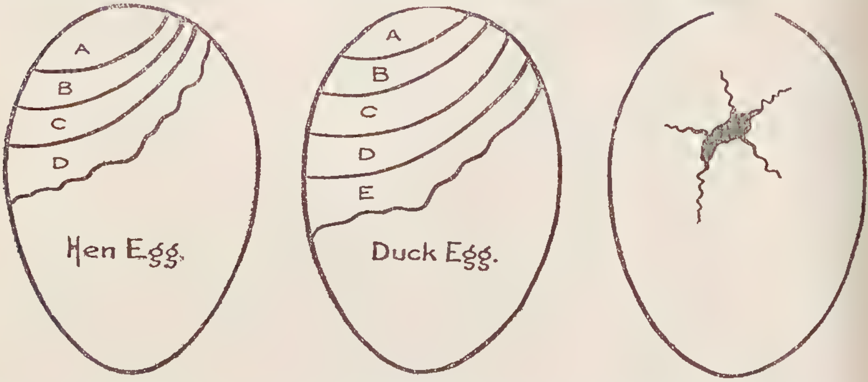
ARTIFICIAL INCUBATION.

By WILLIAM GRAVE.

Different people have different methods and ideas in hatching ducklings and chickens. My way may not appear quite right to a great number, but I'm not trying to teach those "who know"—am merely giving my mode of "Artificial Incubation" for the benefit of numerous inquiries received on above subject, and for those who think they may gain something by reading my remarks. However, I think my method the very best so far, and will now endeavour to enlighten you on the subject.

I have studied "the hatching problem" from beginning to end, have experimented with the natural way and artificial way, and find the only safe criterion to go by is the "air cell." The first thing necessary is a reliable incubator—a machine one may trust; a machine with *proper ventilation*, a reliable *capsule* or *thermortatic bar;* a machine that is self-regulating; one that will not be affected by outside temperature; one that will not warp or crack; and a machine that will distribute moisture to every corner of egg-drawer. I have tried nearly every make of machine on the market, both hot air and water machines, and find the water machines best. With a hot-water machine, should the light go out, the eggs will be kept warm for a considerable time, and have less chance of being spoilt; but with a hot-air incubator, should the light go out, it cools very quickly, and has a better chance of chilling the eggs and spoiling one's batch. The two very best machines I find are George Stanes' Perfected Excelsior, hot water, and Dobeson's Zenith, also hot water—the former an American machine; the latter, a Sydney-made machine. Well, say we have a good incubator; the next thing is a suitable place to stand and work it. An incubator with luck may be worked nearly anywhere, but we must not trust to luck; it may serve us a dirty trick. What we require is a good cellar, room, or shed; must be free from draughts, but well ventilated; and do not go in for any fancy floors, such as cement, asphalt, boards, &c. Take my advice and set your incubator on Nature's floor—"the ground." We want to work to Nature as near as possible; therefore there is no necessity for any artificial floor. Have all ventilation in the room entering above your incubators; otherwise, coming into the room from below or directly in line with the incubator, the draught is apt to put the lamp out. Well, we have our incubator fixed up in our room; the next thing we require is eggs, and good eggs at that. Never set eggs all shapes and sizes; avoid crinkly shells; also chalky shells—that is eggs that feel very chalky to the touch; and always wash eggs in luke-warm water and wipe dry before setting. Eggs will stand a deal of usage before setting, but after they are set one must not take liberties with them, though they may be handled to a fair extent. Another thing; I do not believe in keeping eggs for setting for two weeks, though I have kept them twice as long with good results. Set your eggs as fresh as you possibly can; set all good-shaped and good-shelled eggs, and all of a uniform size if possible; never put forty eggs in a machine to-day, twenty to-morrow, and so on; get all you want to hatch in together; it is bad policy to start then add more later on. One should always try the machine for a few days before trusting it with eggs; get full control of it empty, then put eggs in—it is the safer way. I have known people to buy an incubator, fill it with good eggs and let it take its chance, get bad results, then blame the machine, and why? Simply because they never knew the lamp from the wick, let alone the capsule, &c. However, say you have started your machine on 1st of month, close it up and do not touch your eggs until the 3rd, then turn and cool eggs slightly, close incubator door while eggs are out being turned; attend to your lamp every morning, fill it twice a day; be sure and have a reliable thermometer and always place it in centre of drawer with bulb end resting between two fertile eggs. You will say, "How can we tell fertile eggs?" I will tell you directly. Eggs should be cooled from five minutes to half-an-hour as hatch progresses. Do not be afraid to leave them out for a while, as the old hen

leaves her nest for a good period every day, and we must copy the old hen as near as possible. Be sure to turn eggs twice every day, commencing on third day; discontinue cooling and turning on eighteenth day for hen eggs and twenty-fifth day for duck eggs. Always run machine at 102 to 103 degrees, and be careful not to let temperature run down when hatching, as it causes chicks and ducks to stick in the shell. Do not forget to cool down, as it makes chicks and ducklings strong. When life begins to generate in eggs it produces animal heat, increasing as the hatch progresses, thus the heat has a tendency to run up in machine; watch carefully and regulate accordingly. Test your eggs on fifth day, throwing out all unfertile ones. We test eggs by means of a small egg-tester supplied with each incubator; if a good one, all we do is to light our tester (it burns oil), hold egg to opening on one side, look through, and by so doing we may see the germ. A good fertile egg, on fifth day, seen through tester, shows a little germ for all the world like a red spider, thus—



In fact, it is quite easy to test in a dark room with merely the aid of a candle. Eggs are sometimes quite clear and unfertile, from which no life whatever may be gained; then there are some which show a trace of life, but the embryo dies almost at its first appearance; there are others a little stronger which maintain life for a few hours or days and die; then some live to time of hatching and die trying to liberate themselves from the shell, and why? all through difference in vigour.

Moisture is one of the main things in incubation, and amount of moisture given or to give is always indicated by size of air-cell, and the air-cell, in my estimation, is a safe criterion to go by. With a wide opening of ventilators the air moves through the machine quickly and carries moisture out, and making air-cell larger with a small opening of ventilators, the air moves slowly in incubator, thus we have less drying-down propensities and a smaller air-cell. If you notice the air-cell is getting too large, close your ventilators a little; moisture may be added at any time according to air space, but I very seldom put any moisture in until the last three or four days, and sometimes not until the chicks chip, when, if the stripping or inner membrane of egg is dry, I add moisture at once heated to about 100 degrees. There is moisture enough in an egg to hatch it under ordinary circumstances and in wet weather; so if we have our machine in a damp place you will not need moisture at all; even if we give no moisture the chick may drown in shell through excess of fluid, caused by not enough ventilation. My idea is not to put any moisture in until air-cell is getting too large. There is no danger of drying up the eggs in a day or so. Many people fancy moisture is supplied to soften the shell; but not so, it is merely supplied to soften the membrane and prevent air-cell from getting too large. I have set a hen and an incubator at same time and taken particular notice of both; have worked my machine as near as possible to the hen's method and had good results. I have experimented with natural and artificial means and found out a great deal *re* "Artificial Incubation," and

I am sure, if you run your incubators as I say, you cannot help having good hatches. But, mind you, do not open your machine every now and again to see how things are going on inside—be satisfied to look through the glass. Do not open your machine to satisfy curious friends and let them feel how warm the eggs are ; do not open incubator at hatching time to show your Aunt the little chicks, but just let things alone and be satisfied at looking only at proper time. Another thing I want to impress on you is : Do not be in a hurry to feed your chicks or ducklings as soon as they leave the shell, as Nature supplies food enough for twelve to forty hours after the chicks leave the shell ; if they ge out, say this morning, you need not feed them until next day, any time. When the eggs chip, close your machine, stop the temperature at 103 degrees and wait till you think the hatch is finished ; then remove the lot ; don't move two or three at a time, as it spoils the chance of others. I have shut my machine up for three days, and would not open it for anyone while hatching. You do the same. I enclose diagram of egg and how it should appear at different periods of incubation.

STERILISING EGGS.

The *Dairyman* says that the process for sterilising eggs discovered by Mr. W. E. Ellis, of Wellington (N.Z.), has been thoroughly tested, with gratifying results. Nine months ago Mr. Ellis, who was then in business at Stratford, treated a number of eggs by his system, and stored them in an ordinary iron-roofed building at Stratford, after getting them stamped with the date by the local manager of the New Zealand Loan and Mercantile Agency Company. The eggs were taken to Wellington and found to be as wholesome as the day they were laid. One of them was cooked and opened up at the Agricultural Department, and was as good as any new-laid egg. The poultry expert pronounced the test to have been thoroughly successful.

PINK EGGS.

A correspondent writes that a gentleman at Gladstone one day discovered that his fowls were laying pink eggs. On giving attention to this, he found that five or six hens out of the flock were laying pink eggs, varying in shade from deep rose pink to very pale. These eggs were fertile, as was proved by eight chicks being hatched from a setting. The colour runs right through the shell, which is otherwise like an ordinary shell. The hens that laid them were apparently of the same class as the others of the flock, and were fed on the same food on the same grass run.

Our correspondent vouches for the truth of this freak of nature, and would be glad to hear if anyone else has had a like experience.

GREVILLEAS DOOMED.

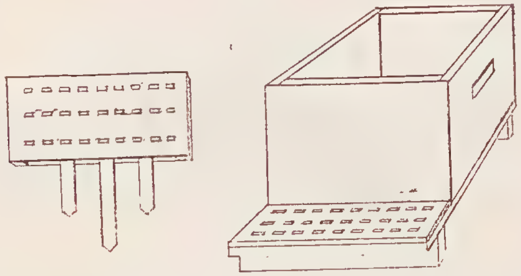
It is stated by the *Tropical Agriculturist*, Ceylon, that the grevillea trees (silky oaks) are all dying out in the Uva district in that island, owing to a fungus attacking the roots. It has been recommended that the trees on all the affected estates be uprooted and destroyed. The editor of the journal named asks : Who can tell us if the silky oak is affected in this way in its native home of Queensland ? We can assure the editor that no disease of any kind has ever been known to attack the grevilleas in Queensland, except one that many human beings are subject to—extreme old age. After forty or fifty years, some trees may decay from this cause, but there is no healthier or hardier tree in the Queensland scrubs. It grows almost as well when transplanted into the forest country or into parks and gardens, and exhibits no form of disease in any portion of its structure.

Apiculture.

THE APIARY.

By H. R. STEPHENS.

The work this month in the apiary will consist mainly in seeing that, in the colder districts, the bees are sufficiently condensed to conserve warmth and that the food stores are ample to carry them into the warm spring, the dry weather prevalent having affected the yield of honey as well as that of other products. Just now is the proper time to overhaul all hives and appliances and to make new boxes and frames ready for September. Frames, as they are extracted, should be put carefully away in hives with the covers put on. The frames should be examined occasionally to see that the bee moth is not attacking them. The entrance to hives should also be contracted, where necessary, by some sort of guard. A useful guard is here illustrated—



The materials required are a piece of tin 14 inches by 7 inches, a piece of bee zinc 14 inches by 7 inches, and a few pieces of $\frac{7}{8}$ by $\frac{5}{16}$ inch pine. This guard, which also serves as a queen excluder and drone catcher, is then put together as shown in the sketch.

POISON IN TEA.

The following letter was lately addressed to the editor of a West Australian journal, which, however, will probably not have the slightest deterrent effect on such inveterate teadrinkers as Australian bushmen and farmers:—"At a recent lecture given by Dr. D. H. Kress, at the Seventh Day Adventist Camp, on Lord street, the doctor said: A cup of tea contained more poison than an equal quantity of beer; the theine or poisonous principle found in tea was more injurious to the nerve and brain than alcohol. In proof of this, he said that one cup of tea, as ordinarily made, contained two and one-half grains of theine, or sufficient to kill twenty frogs. Two cups contained five grains, and five grains would destroy a rabbit. Seven grains of theine found in three cups of tea would kill a cat, in spite of the proverbial nine lives. He affirms that the stimulation produced by tea is intoxication, the same as by whisky or beer. If this is true, would it not be well to organise an anti-tea crusade? More tea is consumed in Australasia than in any other country in the world. I have determined, after listening to the learned doctor, that as for me and my house we will drink no more tea."

The Orchard.

A HINT TO FRUITGROWERS.

By S. C. VOLLER.

A short time ago, while riding along a country road through one of our best orange-growing districts, I met a cartload of oranges on the way to the nearest railway station.

This fruit may have been intended for the Brisbane market, or its destination may have been Sydney or Melbourne; on this point I have no information. But there was one thing about that load of fruit that struck me suddenly and forcibly, that made me wonder what some of our growers are thinking of; and further, made me wonder what is the good of instruction and advice in the matter of handling fruit. That one thing was this: Every case that I could see was standing *on end* in the cart, and had come its journey in that position!

Now, fancy fruit being jolted along a bush road on end, and then shipped off to some distant market! What chance has that fruit of presenting a sound and attractive condition and appearance under the salesman's hammer? Is it not almost certain to be so seriously damaged as to lose a big percentage of its value? No other result is possible; and yet growers complain from time to time of their fruit going wrong when they send it away, and that in some way that *they can never understand.*

They declare that it was perfectly sound when gathered and packed; that nothing whatever was the matter with it. Well, all I can say is that there is likely to be a good deal the matter with it after going 8 or 10 miles over bush roads with the cases on end. One of the great points in packing and handling fruit for market is the avoidance of pressure, and all jarring or bumping as far as is possible. But here you have the greatest possible pressure, and the finest chance in the world for the maximum of jarring and friction.

And supposing that the fruit was packed in the most careful manner to begin with, that careful packing is likely to be very seriously disturbed before the end of such a journey.

I want to say to our growers that this sort of thing will not do. It will neither bring credit or profit to those engaged in the industry.

Care at *every* point must be the motto, or some single act of carelessness will probably spoil a lot of good work and a lot of good fruit at the same time. It is possible that the owner of the load of fruit I have referred to may read this in our *Journal*, and if he does, I want him to take kindly what I have written, as it is offered in the friendliest way, and with a desire on my part for the accomplishment of better things.

A CHEAP WAY OF MAKING HOME-MADE VINEGAR.

Scald a pinch of hops with a quart of boiling water. When lukewarm pour on to ¾ lb. of treacle; stir; then bottle; as it runs over fill up to let any bits run out; then when it has done working tie over with muslin to keep out flies; then keep as long as you like. The great secret of vinegar-making is to put in plenty of treacle, honey, or sugar. The sweeter you start it the more acid it becomes.

Tropical Industries.

TOBACCO NOTES AND CLIPPINGS.

By R. S. NEVILL.

Certain members of Parliament in Sweden are advocating State monopoly of the tobacco industry in preference to increased duties, to prevent the ruin of the local industry.

It is said the American Tobacco Company have tried to secure the monopoly of the tobacco trade from France, and offered more than the Government now realises from it.

Total export of tobacco and its manufacture from Cuba in 1901 was valued at £6,000,000.

Experiments by the United States Department of Agriculture show that best results are obtained with tobacco harvested or cut late in the day; also better results are obtained by harvesting in bright, warm weather rather than dull, cloudy weather.

It was shown that thoroughly ripe tobacco gave a larger yield and cured a better colour than tobacco only half ripe or beginning to ripen.

Other experiments show they have great trouble in securing a desirable cure in very dry weather and in arid districts.

Experiments in Fertilising.

At the Kentucky Experiment Station potassium chloride proved more efficient than the carbonates of potassium and magnesium.

At the Virginia Station dry blood gave the best results as a source of nitrogen.

COFFEE CULTURE IN QUEENSLAND, No. 11.

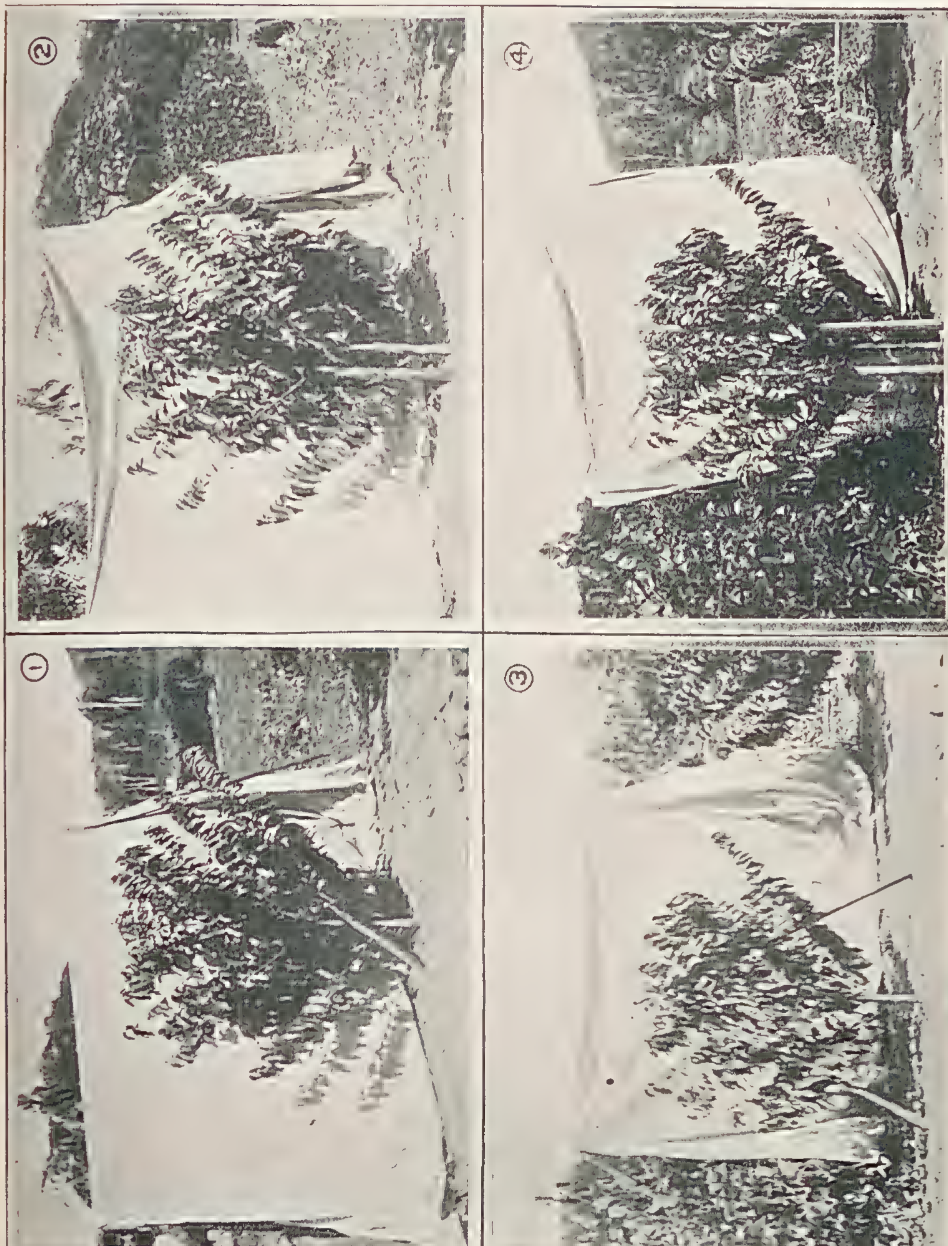
By Mr. HOWARD NEWPORT, Instructor in Coffee Culture.

Staking.

The necessity, in opening up areas under coffee, for avoiding such localities as are subject to strong wind has been pointed out in the article, "Selection of Land and Locality," *Queensland Agricultural Journal*, April, 1900, under the heading of "Aspect"; and some of the damage that may occur through wind mentioned in the chapter on the "Treatment of Young Plants in the Field," under the heading of "wind-rung" plants, and the necessity, in consequence, of staking there hinted at.

The staking or supporting of young coffee-trees by means of a strong stake is not an inevitable work or expensive, but nevertheless frequently becomes necessary for various reasons, such as the fact of the unavoidably bad aspect of the clearing, the unexpected occurrence of wind after the scrub has been removed, or the removal of natural wind-belts or wind-breaks in extending a clearing, or by one's neighbour's clearing. The prevailing wind should be noted carefully when opening, but this in itself is not enough, and any susceptibility to wind should be carefully looked for after the plants have been put out into the field. The damage that may be caused by wind is not merely that of wind, ring-barking the trees, or straining the roots, as described in "Treatment of Young Plants in the Field," *Queensland Agricultural Journal*,

Plate X.



Staking Coffee Trees.

June, 1901, page 439, which is bad enough, but also by denuding a young plant of leaves, knocking off the young crop or spike by rubbing primaries together, and even, if severe, by breaking trees down entirely.

The staking of coffee is generally only necessary during that period of the estate's growth before the trees cover the ground sufficiently to prevent the wind getting through, under, or between them, and, in short, until they are sturdy enough to withstand wind and to protect each other.

As soon as a young plant puts on enough leaves to offer any resistance it will begin to be affected by wind, if there is any, and it is then that the proper staking of the trees should be looked to. In this work, as in most, there is a right way and a wrong way of doing it, or rather, perhaps, methods whereby greater effect can be obtained, at possibly less cost or trouble, than by other methods, and about which very varied opinions are held.

When a plant is quite young, and even possibly during the first year of its life in the field, the lining peg, if properly put in, gives it sufficient support. This is generally put in, if the land is on a slope, close to, but above, the plant and sloped slightly towards it to serve the double purpose of preventing the covering up of the plant and steadying it in windy weather. (See article on "Planting, &c.," *Queensland Agricultural Journal*, May, 1901, page 374.) If on level land it is put in on the windward side upright and quite close to the stem.

Until a plant is at least 18 inches high, it will not be necessary to tie it, but when ties are used at this age of the plant they should be of soft material —fibre or bark, &c.—and tied in the form of the figure 8, the stem of the plant occupying one loop and the stake the other, so that rubbing and chafing is prevented, and the expansion of the bole, which is fairly rapid just then, is in no way hindered. From one and a-half to two years old, and from then often until three years old, the trees will require longer and stronger stakes, as they present so much larger a surface of resistance to wind and are not yet sturdy or self-protecting. Especially will this be necessary if the field has grown at all rapidly, and become thin or spindly. The trees will now be 3½ feet to 4 feet high, and perhaps even be already topped at 4½ feet, as is the tree in the illustration, which is eighteen months old in the field.

The old style of staking coffee as shown in Figs. 1 and 2 is not to be recommended, for it will be obvious that the greater amount of leverage is obtained on the tree by the wind at the top, and not near the ground. This will be forcibly demonstrated with a small flag on a stick on a windy day, when the ease with which it can be held steady while the hand is at the top of the stick is in great contrast to the amount of strength that is required if the stick is held at the ground end. In this old style the stakes have to be particulary strong and very firmly tied. This tieing has to be done so tightly, to be of any use at all, as to often ringbark and kill the tree, and is also frequently breaking and having to be retied. I have seen galvanised iron tie-wire thus used, even when double, snapped in a gust of wind, when a thread of cotton would almost have held the tree steady if tied in the right place. It will be seen then that, the roots of the tree being firmly fixed in the ground, it is the top of the tree that must be held to keep the whole firm rather than the middle or lower parts of the stem. Short stakes therefore are of comparatively little use, and are, moreover, difficult to drive in sufficiently firmly without also damaging the tree.

Stakes to be of use must be at least as high as the tree after being firmly driven into the ground. To be firm they will have to be at least a foot in the ground, and, if wet or specially soft ground, some 18 inches. These posts must therefore be 5 feet or so in length, should be about 2 inches in diameter, but need not necessarily be of hardwood, for unless the weather is positively cyclonic the strain on them will not be great. Nor need they be barked; it is often better for the coffee-tree, in case of any friction, for the bark to be on the stake, and in any case split stakes are to be deprecated on account of the roughness and unavoidable edges and corners that scrape and rub the bark off the coffee branches.

The time of year at which this work may be done is immaterial. It is obviously advisable to have the trees staked before the windy weather sets in, but as the fixing of the stakes may take a little time it is better to begin early in the season—at any time when other work will allow of its being taken in hand—than to leave it until the damage is wrought. The stakes may be cut any time, of common scrub saplings, roughly pointed at one end and stacked.

It is always advisable to have two stakes to a tree, however, which set, one to windward and one to the leeward, and as close as possible to the stem, will prevent any play on the part of the tree whichever direction gust may come from.

This double staking also saves tying, which becomes unnecessary, but which, in single staking, is unavoidable. However carefully tying is done, I have never yet seen absolutely satisfactory results with it; there is, moreover, always the fear of tieing too tightly or too loosely and of doing no good in either case. I have seen stakes put 3 feet away from the tree to prevent (the owner explained) any possibility of friction against primaries, but the subsequent result of the tree groaning and straining and swaying all ways but one at the end of its 3-feet tether, could scarcely be called satisfactory.

In staking, therefore, the stakes should be as close to the stem as possible. There need be no fear of damaging roots if the stake is properly pointed and carefully put in before being driven home with a light mallet. In putting the stake in, care must be taken not to rub off spike or crop, or otherwise break or damage the tree or branches, and if previously a tall wind blown, the tree must be carefully set straight and subsequently mulched well up with earth.

There are two ways in which the stakes may be put in, which are shown in Figs. 3 and 4. Fig. 3 is the upright method, which has the advantage of supporting the tree all the way up from root to top, and Fig. 4 has somewhat greater strength owing to the angle at which the stakes are set. Either method is correct, and both are useful under special conditions. As already stated, tieing is generally unnecessary, especially in the upright method, but should it be desired, or the fear be entertained that the support is insufficient, the ties used should still be of soft material if possible. Wire is to be deprecated, even if shields of leather or bark are put round the coffee stem. When tying with double stakes, the ties should be in double figures of eight—namely, with three loops, one round each of the stakes, and the stem, of the coffee tree in the centre one.

Should it be found inconvenient, for want of time or material, to put in double stakes, a single stake can be made to suffice, but, of course, tieing will then be inevitable. A single stake will give far greater stability if upright than at an angle, but either of these methods are far more satisfactory than single or even double *short* stakes.

HOME-MADE SHEEPSKIN RUG.

Take a fresh skin, pick out the dirt and wash the wool in slightly warm soapsuds, to which you have added a tablespoonful of kerosene oil. Wash in another suds or until the wool looks white and clean. Put it in cold water to cover it, and dissolve ½-lb. each of salt and alum in three pints of boiling water. Pour this over the skin side, and rinse it up and down. Let it soak in this for twelve hours, then hang up to drain. When nearly dry, tack it, wool side in, on the side of the barn to dry. Rub into the skin 1 oz. each of pulverised alum and saltpetre, or double this if the skin is large. Rub for an hour or two. Fold the skin sides together, and hang away for three days, rubbing every day or till perfectly dry. Then with a blunt knife clear the skin of impurities, rub it with pumice or rotten stone, trim into shape, and you have a warm rug that should last a lifetime.

Horticulture.

THE ROSE.

The great secret in successful horticulture is a perfect knowledge of the seasons, so as to adapt each variety of cultivated flowers to the needful temperature and rainfall. For roses to give complete satisfaction, they must be allowed ample room for the roots to spread and feed, with plenty of light and air to ripen the wood. Hence seasonable planting, seasonable pruning, and seasonable working are the elements of success.

The proper season for planting roses is from March to August, and the main pruning should be done in June or July. The cuttings may be planted in beds for future setting out. The freest flowering roses are the Tea, Noisettes, Bourbons, and some of the hybrid Chinas and perpetuals. Some of the Teas and Noisettes will bear pruning whenever they are at rest and out of bloom, and this process will hasten their blooming again. Hybrid perpetuals must only be pruned during the main pruning season. The best soil for roses is a deep, rich strong loam, free from stagnant moisture. Some like a sweet clay subsoil. Sandy, gravelly soils are not suitable. But if such are the only soils available they must be improved by a dressing of strong loam in conjunction with cowdung or nightsoil; the latter, if properly prepared and not too fresh, is really the very best manure for roses in all but soils which are naturally rich. If artificial manures are used, the trees will be much benefited by a manurial dressing once in three weeks of 1 lb. of nitrate of soda to from 50 to 75 gallons of water. After application, moisten the soil slightly. Old stocks require more dilution—say, 100 gallons of water to 1 lb. of nitrate. The soil may be soaked with this.

Heavy soils are improved by adding burnt earth or gritty refuse with stable manure and leaf mould or cocoa fibre refuse. Damp soils must necessarily be drained. Roses require a constant annual supply of manure, with liberal supplies of water, during the growing season, and especially must they be kept clear of aphides and other insect pests. This may be done by dusting them with tobacco dust when the branches and leaves are moist with dew, and washing it off with a syringe next day, or spray them with tobacco water or kerosene emulsion. In Vol. VI., page 381, of this *Journal*, we illustrated a very excellent spray pump, possessing the advantages of lightness, cleanliness, and effectiveness. It is especially adapted for ladies' use in the bush or hothouse or for garden spraying, being easily worked. It delivers a fine spray, which may be rendered heavier by working the plunger quickly. Used with a spraying fluid of lemon oil made thin, rose leaf, extract of tobacco, tobacco soap, whale oil soap, it is most effective in searching out green fly, mildew, or insects and scale on delicate flowers and roses. It is also very handy for spraying the walls and roofs of poultry-houses. It is named the Cyclone Spray Pump, and can be obtained for a few shillings at any seedsman's shop in Brisbane.

Some growers prefer to grow roses on their own roots, others on briar stocks. When growing on their own roots, should the tops die down from any cause, the roots will throw up fresh shoots true to their kind, whereas if the grafted rose dies back nothing will come in its place but the original briar. When dwarf beds of roses are required, a good plan is to peg down to within about 6 inches from the ground the strong one-year-old shoots from the root. In due time blooming shoots break out from nearly every eye, and masses of flowers are secured, while strong young shoots are sent up from the centre, the plant being on its own roots. Before the winter, the old shoots which have thus flowered and exhausted themselves are cut away, and three or four more of the strongest and best-ripened young shoots are reserved for pegging down the following season, say in July or August. In the meantime, after the pruning has been effected, plenty of good manure should have been dug in about the roots. Thus treated, the plants never fail to produce plenty of strong wood for pegging down each season.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1901.							1902.					
	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.
North.													
Bowen	0·19	0·10	6·36	0·18	0·93	0·92	0·71	0·19	2·19	2·01	0·68	Nil.	0·44
Cairns	0·57	0·89	2·53	1·82	2·34	5·23	2·78	3·79	12·90	11·43	3·48	2·34	4·97
Geraldton	1·21	2·58	11·77	3·37	3·85	6·45	1·60	3·78	16·87	7·55	12·83	5·39	8·10
Herberton	0·18	0·64	2·53	1·04	4·92	1·13	1·30	0·57	5·77	3·86	1·54	1·07	1·58
Hughenden	0·03	Nil.	0·33	Nil.	0·31	0·29	1·43	1·57	2·02	0·53	*	Nil.	Nil.
Kamerunga	2·09	2·60	1·94	1·72	1·19	5·74	2·16	2·58	10·59	14·24	3·40	2·63	5·12
Longreach	0·09	Nil.	0·37	0·58	Nil.	Nil.	1·71	0·87	0·27	0·18	0·03	0·03	Nil.
Lucinda	2·89	2·17	5·89	0·30	2·59	Nil.	0·32	3·55	11·38	2·67	1·78	*	0·63
Mackay	0·25	1·07	5·14	2·29	1·35	1·85	0·71	3·78	8·43	4·41	6·73	1·26	2·33
Rockhampton	0·24	2·29	3·04	1·78	0·51	0·41	0·19	4·79	1·36	1·68	0·21	Nil.	Nil.
Townsville	0·32	0·19	1·87	0·14	0·90	0·16	0·61	2·24	3·14	1·61	0·35	0·04	0·10
South.													
Barcaldine	0·82	0·63	0·25	0·51	0·54	0·55	0·09	2·39	0·07	0·37	0·02	Nil.	Nil.
Beenleigh	4·15	1·34	4·49	0·70	3·35	1·35	0·14	2·41	1·82	0·68	0·42	Nil.	0·11
Biggenden	1·56	0·74	2·81	2·11	1·35	0·47	0·92	2·12	0·83	1·80	0·65	Nil.	0·04
Blackall	0·90	0·55	0·44	0·88	0·60	0·97	0·32	1·68	0·34	0·34	0·05	Nil.	0·01
Brisbane	3·29	1·31	3·71	1·30	3·25	1·41	0·75	1·38	2·67	0·76	0·17	0·47	0·06
Bundaberg	0·74	2·01	5·59	1·80	2·18	1·28	Nil.	6·33	0·75	1·99	0·43	0·02	Nil.
Caboolture	2·27	3·70	3·18	1·55	5·01	3·17	3·15	2·29	2·66	1·29	1·99	Nil.	0·03
Charleville	0·93	1·27	0·92	0·32	0·04	0·65	0·96	0·47	0·22	0·42	0·23	Nil.	0·12
Dalby	3·59	2·83	1·66	1·11	4·09	0·15	0·42	1·65	0·20	0·30	2·00	Nil.	0·15
Emerald	0·63	0·90	1·74	1·11	Nil.	0·09	0·63	3·28	1·11	0·97	0·30	Nil.	0·01
Esk	2·45	3·01	3·03	1·72	4·87	1·08	2·20	1·81	1·06	0·75	1·25	Nil.	0·04
Gatton College ...	2·93	1·53	3·23	1·06	3·02	0·86	0·26	2·27	1·58	0·26	*	0·04	0·03
Gayndah	2·32	2·29	Nil.	1·91	2·39	0·04	0·38	2·54	0·51	0·99	0·81	0·29	Nil.
Gindie	0·84	1·34	1·77	1·81	0·53	0·02	0·57	1·35	1·46	0·78	0·47	Nil.	Nil.
Goondiwindi	1·73	2·30	1·55	0·67	2·83	0·21	0·20	2·06	0·75	1·20	0·06	0·02	0·41
Gympie	2·82	3·40	3·39	1·34	1·91	1·34	1·25	1·49	1·65	2·33	1·09	0·23	Nil.
Ipswich	3·16	0·97	2·47	3·54	3·98	1·17	0·35	1·45	2·80	0·32	0·03	0·02	0·15
Laidley	2·54	2·00	5·32	1·22	3·37	1·10	1·65	1·79	1·94	0·39	0·10	0·20	0·06
Maryborough	2·22	3·07	5·02	1·05	1·54	1·84	1·54	1·29	0·75	0·96	1·57	0·36	0·24
Nambour	3·33	6·80	4·42	0·98	3·89	2·85	3·89	1·30	2·06	1·61	†	0·26	0·04
Nerang	5·34	0·79	5·41	0·88	4·57	2·70	0·46	3·98	4·54	0·65	0·65	0·35	0·52
Roma	2·66	2·26	0·98	0·43	0·71	0·54	0·83	2·72	1·11	0·54	0·15	Nil.	0·20
Stanthorpe	2·74	1·52	4·22	1·42	2·93	2·22	1·67	3·17	0·51	0·56	0·10	0·87	0·78
Tambo	1·47	0·73	0·74	1·47	0·51	Nil.	0·16	1·73	0·35	0·68	0·04	Nil.	0·01
Taroom	2·19	2·74	2·34	2·11	0·92	0·42	0·31	0·53	1·82	1·30	0·33	Nil.	Nil.
Tewantin	5·15	8·34	4·61	2·71	3·26	1·66	2·70	3·09	1·13	3·44	2·84	0·80	0·91
Texas	1·87	1·00	3·06	1·47	1·47	0·26	0·43	1·95	1·62	0·42	Nil.	Nil.	0·88
Toowoomba	3·57	2·22	5·57	1·85	4·45	1·10	0·87	3·46	1·20	Nil.	0·79	0·03	0·38
Warwick	3·47	1·57	5·74	2·05	3·12	1·19	0·71	3·48	0·65	0·55	Nil.	0·15	0·63
Westbrook	3·48	1·64	6·50	1·75	2·27	0·59	0·31	3·21	1·04	0·06	0·41	Nil.	0·28

* Returns not yet received. † Data unreliable.

CLEMENT L. WRAGGE,
Government Meteorologist.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Choicest salt Canadian, 98s. to 100s.; finest, 94s. to 96s.; sellers, 2s. per cwt. more. Danish, choicest, 104s. to 106s.; finest, 100s. to 102s. The New Zealand season is at an end. Choicest is quoted at 102s.; finest, 94s. to 96s. per cwt. No quotations for Australian.

CHEESE (duty free).—American, 55s. to 58s.; Canadian, 54s. to 60s. New Zealand, 54s. to 58s. per cwt.

Condensed Milk.—18s. 6d. to 20s. 6d. per case in 20-case lots.

Sugar (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £15 to £17 per ton; raw, £11 to £15 10s. per ton. German beet, 88 per cent., 6s. 2d. per cwt.

Syrups (duty, 2s. per cwt. and ¼ per cent.).—Finest, 14s. to 17s. 6d. per cwt.

Molasses (duty, 2s. per cwt. and ¼ per cent.).—5s. 9d. to 8s. per cwt.

Rice (duty 3d. per cwt.).—Rangoon, £7 to £14; Japan, £13 to £16; Java, £18 to £24; Patna, £17 to £21.

Coffee (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 43s. to 100s.; peaberry, 75s. to 120s.; Santos, 35s. to 96s.; Mocha, 65s. to 80s.; Jamaica, finest, 100s. to 120s. per cwt.

Arrowroot.—St. Vincent, 2¾d. to 4½d.; Natal, 5½d. to 6¼d.; Bermuda, 1s. 8d. to 1s. 10d. per lb.

Wheat.—Australian, white, 33s. 3d.; New Zealand, white, no quotation; Duluth, red, 31s. 3d.; Manitoba, red, 32s. 3d. per 480 lb.

Flour.—Australian, 23s. 6d. per 280 lb.

Malting Barley.—English, 26s. 6d. to 28s. 6d. per 448 lb.

Oats.—New Zealand, 26s. 6d. to 28s. per 384 lb.; Canadian, 28s. 6d. to 31s. per 320 lb.

Split Peas.—47s. 6d. per 504 lb.

Ginger.—Japan, 31s. to 34s.; Jamaica, 60s. to 70s.; low and common, 38s. to 42s. per cwt.

Pepper.—Capsicums, 16s. to 80s.; chillies, 34s. to 37s. per cwt.

Tobacco.—American. Messrs. Thomas H. Edwards and Co., Liverpool, report as follows on the Tobacco Trade:—

STRIPS.	1902.	1901.
Western—		
Fillers	4½ @ 5	— @ 4
Rather short	5¼ „ 6	5 „ 6
Very middling to middling	6¼ „ 6¾	6¼ „ 7
Good to fine	7 @ 8 @ —	— @ 7¼ @ 8
Burley	5¾ „ 8½ „ —	— „ 8½ „ 11
Virginia Dark—		
Fillers	5¼ @ 5¾	— „ 4½ „ —
Rather short	6 „ 6¼	5 @ 5½
Very middling to middling	6½ „ 7½	6½ „ 7½
Good to fine	8 „ —	8 @ 9 @ —
Virginia and Carolina Bright—		
Semi-dark	— „ 7½	— @ 5½
Semi-bright	8 @ 9 @ —	5¾ @ 7 @ —
Medium or mixed ...	10 @ 11	8 @ 9
Good to fine	11¼ @ 12½ @ 14	9½ @ 11½ @ 13

LEAF.	1902.	1901.
Western—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade	— @ 4	3 @ 4
Medium to good trade	4½ „ 6	4½ „ 6
Burley	7 @ 7½ @ 8	6 @ 7½ @ 8
Virginia Dark—		
Common export ...	— @ —	None.
Short trade	— „ —	— @ 3½
Medium trade ...	4 „ 5	4 „ 5
Good to fine trade ...	5½ „ —	5¼ „ —
Virginia and Carolina Bright—		
Common or semi-bright	6 „ 7	4 „ 5
Medium or mixed ...	8½ @ 10 @ —	6½ @ 8 @ —
Good to fine	11 „ 12 „ 15	9½ @ 11 @ 15

Wine.—Australian Burgundy: Wotonga, red, 13s.; Waratah, red, 18s., per dozen bottles. Quart flagons, per dozen, 17s. and 23s. respectively.

Green Fruit.—Oranges, Valencia, from 11s. 6d. to 14s. per 420 for common sorts, to 30s. to 32s. for finest selected. Lemons, finest selected, 22s. to 32s. per case of 420; bananas, 6s. 6d. to 12s. per bunch.

Cotton.—Market in a disturbed state. Quotation, nominal, 6d. per lb. for clean Uplands.

Cotton Seed.—£7 18s. 9d. per ton.

Cotton-seed Oil Cake (decorticated).—£6 5s. to £6 12s. 6d. per ton.

Cotton-seed Oil.—Crude, £25 15s. to £26 per ton.

LINSEED.—55s. to 60s. per 416 lb.

LINSEED OIL.—£33 to £33 5s. per ton.

LINSEED OIL CAKE.—£7 17s. 6d. to £8 2s. 6d. per ton.

MANILLA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£33 10s. per ton.

WOOL.—Prices practically unchanged since previous wool sales.

FROZEN MEAT.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

	July 2.	July 9.
New Zealand Mutton. (Crossbred Wethers and Merino Ewes.)		
Canterbury	$3\frac{13}{16}$d.	$3\frac{3}{4}$d.
Dunedin and Southland	$3\frac{11}{16}$d.	$3\frac{5}{8}$d.
North Island	$3\frac{5}{16}$d.	$3\frac{1}{4}$d.
Australian Mutton. (Crossbred and Merino Wethers.)		
Heavy (over 50 lb.)	$3\frac{5}{16}$d.	$3\frac{1}{4}$d.
Light (under 50 lb.)	$3\frac{5}{16}$d.	$3\frac{1}{4}$d.
River Plate Mutton. (Crossbred and Merino Wethers.)		
Heavy	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
Light	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
New Zealand Lambs.		
Prime Canterbury (32 lb. to 42 lb.)	$4\frac{3}{8}$d.	$4\frac{5}{16}$d.
Fair average	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.
Australian Lambs.		
Prime (32 lb. to 40 lb.)	None offer-	—
Fair average	ing.	—
New Zealand Frozen Beef.		
Ox, fores (100 lb. to 200 lb.) ...	$3\frac{1}{4}$d.	$3\frac{1}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	5d. (nominal)	$5\frac{1}{4}$d.
Australian Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	None offer-	—
Ox, hinds (180 lb. to 200 lb.) ...	ing.	—

The prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations of Australian and New Zealand lambs do not include sales of small lambs or heavies or inferior quality.

EGGS.—French, 8s. to 8s. 6d.; Danish, 6s. to 8s. 3d. per 120.

BACON.—Irish, 65s. to 69s.; American, 40s. to 54s.; Canadian, 60s. to 61s. per cwt.

HAMS.—Irish, 102s. to 108s.; American, 52s. to 58s. per cwt.

TALLOW.—Beef, fine, £33 6s.; medium, £30 10s; mutton, fine, £38; medium, £33 10s. per ton.

General Notes.

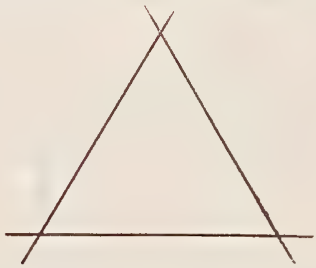
TO CLEAR LAND OF OLD STUMPS.

Mr. H. Armitage, Pomona, says that in clearing land of stumps he has found a common timber jack an invaluable aid. He has grubbed nearly 6 acres of very heavily timbered land, and "run" the roots to a depth of 18 to 20 inches without any other help. He first burns the crown and top roots down to the required depth by means of short "burners" or logs, removing the earth as the fire makes its way down. There is now left a deep hole, whence the roots radiate horizontally. Under these he places the foot of the jack, and lifts the roots and great masses of earth with them. This method would, however, not be applicable with green timber requiring to be grubbed at once. Mr. Armitage's land had been a pine scrub, but it carried as much and as large gum, bloodwood, and bastard box as any forest land he had seen. The scrub stumps had all rotted away, and the hardwood ones were quite dead and dry when he set to work to get rid of them.

This reminds us that many people who are clearing land do not understand how they may save a great deal of labour by the judicious use of what Mr. Armitage calls burners. Where many large dry logs have to be got rid of, and bullocks are not available to haul them together, cross-burning will quickly reduce them to a manageable size. We once cleared 14 acres of dead ironbark and gum logs, single handed, without using a crosscut saw. At every 8 or 10 feet of the logs a stout log some 8 inches in diameter was laid against the log to be destroyed. Fire was then applied on top of the latter, and the burner ate down into it, only burning away very slowly itself. One man can keep a large number of logs burning in this manner. When the logs were burnt through, it was an easy matter to roll the short lengths together and burn them. The great advantage of this method of clearing is, that a man can go about his ordinary farm work while the fires are working for him at the logs. Of course this does not apply to green timber, although some kinds of box, white gum, and ironbark may be burnt in this manner whilst still green.

PULLING UP OLD POSTS.

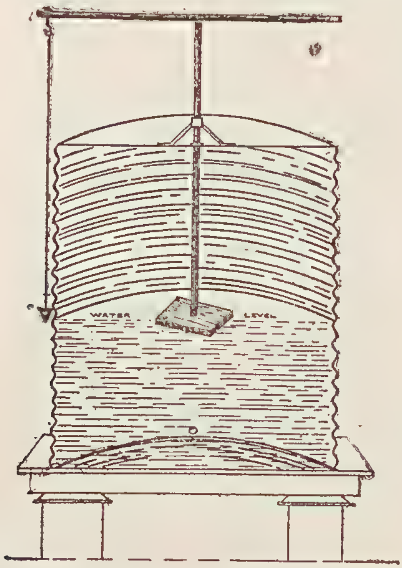
Mr. Drummond Macpherson, Cairns, writes:—In the June number of your *Journal* I notice a device for pulling up old posts—viz., a wheel. As a wheel with a broad tire is not always available, I venture to give another way, which, I think, is equally as speedy, possibly more powerful, and anyone could make the required triangle. Get three pieces of 3 inch by 3 inch hardwood, about 4 feet long; half-check them into each other so as to form an equilateral



triangle, with the six ends projecting about 4 inches. Lean this against the post at an angle of rather less than 45 degrees, fasten a chain round the post to the ground, pass it over the top fork of the triangle. One staunch horse will pull with ease any ordinary fencing post. Care should be taken to have the chain as tight as possible between the foot of the post and fork of the triangle; otherwise the lifting power got as the triangle comes to the perpendicular will be lost.

AN EASILY MADE TANK-GAUGE.

Mr. H. R. Stephens, Toowoomba, sends us yet another mechanical appliance which, he says, will show exactly the quantity of water collected in an iron tank without the owner having recourse to the usual tapping the knuckles on the corrugations of the tank. This contrivance is a simple gauge which anyone handy with tools can easily construct by studying the accompanying diagram—



It will be seen that the instrument records the height of the water as being at H. This is accurate—far more so than by tapping.

SAN JOSE SCALE.—A SUCCESSFUL EXPERIMENT.

Mr. G. F. Fletcher, Sandy Creek, Warwick, writes that he has been successful in getting rid of the San José Scale on his fruit-trees in a very simple but effective manner. Cyaniding being out of the question, he decided to try the sulphur and lime treatment, and, at the same time, to test the value of eucalyptus in combination with the other ingredients. He made a strong decoction of gum and box leaves, which he used to make the mixture, instead of plain water. A little wheaten flour was added to make a workable paint. This was applied to every portion of the trees in the orchard. As a result, there has not been a sign of San José Scale during the whole season, and Mr. Fletcher is now pruning the trees, and finds no scale on them.

He says that possibly other causes, of which we know nothing, may have assisted in the extermination of the scale, but possibly also he may have hit upon something of value to those who have to fight this dread pest.

We sincerely hope this may be the case, as there are many growers of a few fruit-trees who have no means of cyaniding their trees, and to these the discovery of so simple a remedy would come as a boom. We hope that other orchardists will try it and give the benefit of their experience to fruitgrowers generally through the medium of this *Journal*.

Answers to Correspondents.

RINGING PIGS.

Arthur Byford, Kolan River, Bundaberg—

Question 1.—Does your Department recommend the ringing of pigs?

Answer 1.—No, unless they are given to rooting when turned into lucerne paddocks; in such cases it is advisable.

Question 2.—Is it customary at the Agricultural College or Experimental Farms?

Answer 2.—No.

Question 3.—What are the advantages to be obtained?

Answer 3.—To prevent pigs from rooting lucerne, clover, and grasses.

SUNFLOWERS.

Adam Reid, Almora, Nanango—

Question.—Will you, through your *Journal*, be good enough to give me some definite information as to planting sunflowers—*i.e.*, How and when to plant; and treatment of sunflower seed for oil?

Answer.—The sunflower will grow in almost any soil and in any climate. It will bear cold or heat, drought or rain. It is subject to no disease, and to no climatic disqualification. The cultivation is very simple. The plant is not at all particular, but prefers light, rich, well-drained soil. It is advisable to sow early—say, the beginning of September—to secure perfect maturity. The quantity of seed per acre will vary from 4 lb. to 6 lb. It should be sown in drills, 5 feet between the rows, and the seed drilled or dibbled in at intervals of 3 feet. The plants may afterwards be thinned out, if found necessary, owing to exuberant growth, to ensure full exposure to the sun—a very necessary condition. As the plants have a habit of spreading their branches and heads in successive layers over each other, thinning is generally necessary. When 12 inches high, a slight earthing up benefits the plants. Sunflowers with many heads do not ripen the seed evenly; therefore it is best to cultivate a species producing only one large head to each plant. The Tall Mammoth Russian is such a variety, and may be planted closer. It produces more seed than any other sort, and can be obtained from most seedsmen in Brisbane, and probably elsewhere. A yield of 50 bushels per acre is not uncommon under favourable conditions. The Mammoth or Giant Russian has often produced flower-heads 15 inches in diameter, and bearing over 2,000 large seeds. The leaves of the sunflower, when sun-dried, pounded, and mixed with meal or bran, make good fodder for milch cows. The oil expressed from the seeds is almost equal to olive oil. There are oilmills in the Southern States the owners of which will buy the seed. But you could put up a simple oilmill, consisting of two rollers driven by a horse gear. The yield of oil is 40 per cent. of the weight of seed, and the oilcake is wholesome and fattening food for cattle, being superior to linseed-cake. The seeds having been driven through the rollers, which are gauged to just break the hard cuticle, are winnowed to separate the husk from them. Then the blanched seeds are put in hempen bags 14 inches wide, and subjected to pressure at a temperature of from 70 to 90 degrees Fahr. When the oil is expressed, it is put into filtering-bags, and drains into vessels beneath.

CLAIMING A ROAD.

A correspondent asks:—

Question 1.—A road runs outside my fence. People make a shorter road through my paddock. If I allow this for 10 years, can my road be proclaimed a public road?

Answer 1.—No.

Question 2.—If a funeral passes through my land without paying a shilling fee, does the road become public property?

Answer 2.—No. An obsolete superstition.

Question 3.—If a mailman passes through my paddock regularly without charge, does the road then become a public one?

Answer 3.—No.

HOW TO MAKE ORANGE WINE.

B.F.W.H., Island and Orchardist, Blackall Range—

Question.—1. How is orange wine made?

Answer 1.—Take half a chest of Seville oranges (400); pare off the rinds, and put two-thirds of them into 6 gallons of water for 24 hours. Squeeze the oranges through a sieve into a pan, and then throw them into another 6 gallons of water; wash them well in it with the hands, and when you have done so put in 6 gallons more water and let the whole stand till next day. For every gallon of wine put into the cask 3½ lb. of loaf-sugar, and the liquor strained clear of any rind and pulp. Repeatedly wash the latter, and if more liquor should be required to fill up the cask, add these washings rather than pure water. Stir the wine daily till the sugar is completely dissolved, and allow it to ferment for about 5 weeks. Add 3 bottles of brandy, stop down, and after 12 months bottle.

Another Recipe.

Gather the fruit when ripe. Peel the oranges. Put into a cask with the head out, and with a tap fitted near the bottom. Pour on boiling water to cover the fruit. Mash the pulp with your hands, and then let the mass stand till the pulp rises to the top and forms a crust in three or four days. Then draw off the fluid into another vessel, and to every gallon add 1 lb. sugar. Mix well, and put into a cask to work for a week or ten days, and throw off any remaining lees, keeping the cask well filled, especially at the commencement. When the working has ceased, bung it down. It may be bottled after from six to twelve months. You may also make the wine as follows:—

Peel the oranges. Express all the juice in a press; strain. To every gallon of juice add 1 lb. sugar and half-a-pint brandy. Pour into a cask, but do not bung till it has done working. Then bung it close for three months and draw off into another cask. When it is fine, bottle and cork well.

Question 2.—What portion of the bamboo should be planted? At what season?

Answer 2.—Take a portion of the root with a shoot just springing from it. Cut off the standing bamboo attached to the root about 2 feet in length, taking care that it has an eye on it. If planted in the spring, say September, the eye should shoot, but the shoot near the root will make the first wood.

Question 3.—How can I make bread white and flaky like baker's bread? I bake 10 lb. twice a week.

Answer 3.—Try lime water. Five lb. of water saturated with lime used with every 19 lb. of flour produces in bread the same whiteness, softness, and capacity of retaining moisture as results from the use of alum by the bakers. It removes all acidity from the dough, coagulates the gluten, and the bread bakes well.

THICKNESS OF TIMBER FOR A SILO.—GROWING MAIZE FOR SILAGE.

J.M., Nanango—

Question 1.—Would 5 x 2 inch plates and studs be strong enough for such a silo as you describe?

Answer 1.—Yes.

Question 2.—How much good, strong land is required to grow sufficient maize to fill such a silo? What is the best way to plant it?

Answer 2.—From 4 to 5 acres. Sow in drills 4 feet apart and 15 inches in the row. Allow the maize to cob. When it has reached the "glazed" stage, cut it for the silo. By putting it in too young, before it has cobbed, you run the chance of making bad silage, besides filling the silo with some tons of matter containing no nutriment, such as water, &c. You might allow the maize to ripen and still get from 10 to 15 tons of good silage per acre, in addition to 30 or 40 bushels of grain.

TREATING REFRACTORY CREAM.—PRAIRIE GRASS SEED NOT GERMINATING.

Adam Reid, Almora, Nanango—

Question 1.—We have a cow which gives about 2 quarts of milk in the morning and about 1½ pints at night, and its butter averages 2½ lb. per week. In making the butter with matured cream, the cream swells and gets very thick and stiff, and getting it to break is a great source of trouble. We keep the cream in a warm place. What is the cause, and what the remedy? The cow feeds on corn-stalks.

Answer 1.—The temperature at which the cream is churned is too low, and the density of the cream is too thick. Churn at a temperature of 60 degrees Fahr., and reduce the density of the cream by adding a small quantity of water at the same temperature.

Question 2.—I sowed prairie grass seed last January, and there has not been moisture enough to start it. Will the seed perish or germinate when sufficient moisture comes?

Answer 2.—If there has been no moisture to start the seed, it will probably not perish, but remain in the dry soil until good rains come, when most of it should germinate.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	JULY. Top Prices.
Apples, per case	8s. 6d.
Oranges, per case	6s.
Mandarins, per case	9s.
Lemons, per case	8s. 6d.
Seville Oranges, per case	3s. 6d.
Gooseberries, per quart	6d.
Pineapples, rough, per dozen	4s. 6d.
Pineapples, Queen, per dozen	6s.
Tomatoes, per quarter-case	4s. 9d.
Custard Apples, per case	5s. 6d.
Peanuts, per pound	3d.
Granadillas, per dozen	1s. 6d.
Passions, per quarter-case...	3s. 6d.
Shaddocks, per case	2s. 6d.
Citrons, per cwt.	7s.

AVERAGE TOP PRICES FOR JUNE.

Article.		JUNE. Top Prices. £ s. d.
Bacon	lb.	0 0 8
Bran	ton	6 4 6
Butter, First	lb.	0 1 6¾
Butter, Second	,,	0 1 3¾
Chaff, Mixed	ton	6 10 0
Chaff, Oaten	,,	6 8 0
Chaff, Lucerne	,,	11 3 0
Chaff, Wheaten	,,	5 12 0
Cheese	lb.	0 0 9¾
Flour	ton	10 10 0
Hay, Oaten	,,	6 0 0
Hay, Lucerne	,,	10 0 0
Honey	lb.	0 0 2⅘
Rice, Japan (Bond)	ton	15 0 0
Maize	bush.	0 4 10
Oats	,,	0 4 0⅕
Pollard	ton	7 17 6
Potatoes	,,	6 19 0
Potatoes, Sweet	,,	5 8 4
Pumpkins	,,	5 12 0
Sugar, White	,,	20 15 0
Sugar, Yellow	,,	17 10 0
Sugar, Ration	,,	15 0 0
Wheat	bush.	0 4 7⅗
Onions	cwt.	0 9 0
Hams	lb.	0 0 11
Eggs	doz.	0 1 6½
Fowls	pair	0 3 7
Geese	,,	0 5 9
Ducks, English	,,	0 3 3
Ducks, Muscovy	,,	0 4 1⅕
Turkeys, Hens	,,	0 6 0
Turkeys, Gobblers	,,	0 13 1⅕

ENOGGERA SALES.

Article.	JUNE. Top Prices. £ s. d.
Bullocks	9 3 6
Cows	6 19 0
Wethers, Merino	0 18 2½
Ewes, Merino	0 13 2½
Wethers, C.B.	1 4 6½
Ewes, C.B.	0 17 6¾
Lambs	0 12 10
Baconers	2 9 6
Porkers	1 9 8½
Slips	0 9 8½

Orchard Notes for August.

By ALBERT H. BENSON.

The planting of deciduous trees should be completed by the end of this month in all parts of the State, but evergreen trees can be transplanted during seasonable moist weather at any time of the year if the operation is carefully carried out. When set out, the young trees must be cut hard back to a height that in no case should exceed 2 feet from the ground, and in warm dry districts half of this height is to be preferred. Cutting back at planting insures a strong and vigorous young growth, whereas by neglecting to cut hard back at planting the future growth, vigour, and symmetry of the tree are greatly impaired if not completely spoilt. The pruning of all deciduous trees must also have been completed; and all citrus fruit trees from which the fruits have or should have been gathered should be gone over carefully, all dead and badly diseased wood should be removed, and any crossing or superfluous branches, or water sprouts, should be cut away. When the trees are badly attacked by scales, this pruning should be severe, in order that the remedies used for dealing with these pests may have a fair chance, as when the top of a citrus tree is allowed to grow like a mat it is impossible to get the spraying material on to the parts where it is most wanted. Spraying should be systematically carried out in every orchard in the State during this and the preceding month, and in the case of fungus diseases on deciduous trees during the following month as well. Spraying is just as essential an operation as the gathering of the fruit; and no fruitgrower who wishes to make fruitgrowing a success can afford to neglect it, as it is impossible to breed disease in fruit trees and to grow fruit profitably at one and the same time. A full description of the operation of spraying and of the most approved remedies was published some time ago in pamphlet form by the Department of Agriculture, so that any grower who has not received a copy and who desires to obtain the necessary information may obtain it by writing to the Department. After pruning and spraying, the orchard should be ploughed; so that all weeds and trash can be buried, and also that the land that has been trodden down firm shall be broken up. Use a short American plough that will take a wide furrow and turn it right over. The depth at which to plough will depend on the treatment the orchard has previously received and on the nature of the soil. If the soil is shallow, or if the land has never been worked, then the ploughing must be shallow or the roots will be badly injured; but where there is plenty of soil and a perfect subdrainage, then the ploughing can be from 4 to 6 inches in depth (provided the land has been previously cultivated) without any injury to the trees. In fact, in such soil surface roots are not required, and the trees stand dry weather best when deeply rooted.

Quick-acting artificial manures, such as sulphate of ammonia, sulphate of potash, or superphosphate, can be applied during the month, but care should be taken not to apply too large a quantity at once, as, owing to their extreme solubility, a considerable portion of them is apt to be washed out and lost by heavy rains. In conclusion, one more word about spraying, and that is: Do your utmost to stamp out diseases in new districts as soon as ever they make their appearance. Do not consider any disease too trivial, and that it can be well let alone to a more convenient time, as the more convenient time will not come; but the disease will flourish and spread rapidly, so that what might have been checked, if not eradicated, by half-an-hour's work, will now take the grower all he knows to get the better of it. In spraying, whether for insects or fungi, a knowledge of the pest to be treated, combined with carefulness and promptitude, are the essentials of success.

In notes of this kind it is impossible that they can apply equally to every part of the State, but they will be found to be about an average. Very early districts will sometimes require the notes of a month later, and very late districts those of a month earlier; but this will right itself when a year's notes have been written.

Farm and Garden Notes for September.

Farm.—Keep all growing crops clean, and attend to the earthing-up of such as require it. Finish planting potatoes before the end of the month. Sow maize, sorghum, imphee, prairie-grass, yams, sugar-cane, tobacco, pumpkins. Sweet potatoes may be planted if vines can be obtained. Do not plant vines from your own fields. Get them from some other part of the State—Roma, for instance—where the sweet potato disease is practically unknown. It must, however, be noted that the fly which does the damage to sweet potatoes is not inherent in the vine, but the damage is done by the insect which goes to the vine, not by one which comes with it. Make the cuttings from 6 to 8 inches in length, plant in ridges with a dibble, and press the soil firmly round the plant.

Cane planting should now be carried on vigorously. Plant out coffee, ginger, arrowroot, and yams.

Kitchen Garden.—This is the best month for general sowings of most kinds of vegetables. Sow largely of all kinds. With care and attention, which mean constant cultivation, watering, and mulching, European vegetables of many kinds may be grown to perfection during the hot summer months. Plant out rhubarb, Jerusalem artichokes, seakale, and asparagus. We do not recommend the planting out of cauliflowers, notwithstanding the garden notes given in many catalogues. Cabbages and eschalots may be planted out for a succession. Melons, cucumbers, vegetable marrows, custard marrows, chokos, spinach, celery, peas, turnips, carrots, tomatoes, French beans, and eggplants may be sown, and also rosellas. Plant out capsicums and make fresh sowings. Keep the crops clean, and manure with liquid manure. It is a good thing to sow newly-dug beds with salt. The action of salt on the soil is not clearly understood, but it is known that, applied as top dressing, it appears to check a tendency to rank growth. Cabbage is especially benefited by salt, but it must not be used too liberally, as it leads to the formation of a pan, and renders soil sterile.

Flower Garden.—Continue to plant bulbs as directed last month, and protect the plants from cold westerly winds, which may still occur. Keep a good lookout for the Vaginula slugs. A ring of tobacco dust 4 inches wide round a bed will effectually destroy them, but if any gap is left they will get through and do incalculable damage. Encourage toads to take up their residence in the garden and bush-house. They are invaluable helpers and are perfectly harmless. Fill up all vacant places with herbaceous plants. Sow zinnia, gaillardia, amaranthus, coxcomb, balsam, sunflower, marigold, cosmia, summer chrysanthemum, coreopsis, portulacca, mesembryanthum, calendula. &c. Put in coleus cuttings as well as cuttings of all tropical plants. Disbud roses to save future pruning, and stake up all bulbous plants. Plant out dahlias, gladiolus, amaryllis, tuberose, ismene, crinum, pancratiums, cannas, &c.

Times of Sunrise and Sunset, 1902.

Date.	August.		September.	
	Rises.	Sets.	Rises.	Sets.
1 ...	6·34	5·14	6·6	5·30
2 ...	6·32	5·15	6·5	5·31
3 ...	6·31	5·16	6·4	5·32
4 ...	6·30	5·18	6·2	5·32
5 ...	6·29	5·19	6·1	5·33
6 ...	6·29	5·19	6·1	5·33
7 ...	6·29	5·19	6·0	5·34
8 ...	6·28	5·20	5·59	5·35
9 ...	6·27	5·20	5·57	5·35
10 ...	6·26	5·20	5·56	5·36
11 ...	6·25	5·21	5·56	5·36
12 ...	6·25	5·21	5·54	5·36
13 ...	6·24	5·22	5·53	5·37
14 ...	6·23	5·23	5·51	5·37
15 ...	6·22	5·23	5·50	5·38
16 ...	6·21	5·23	5·49	5·38
17 ...	6·21	5·23	5·48	5·38
18 ...	6·20	5·24	5·47	5·39
19 ...	6·20	5·24	5·45	5·39
20 ...	6·18	5·24	5·44	5·40
21 ...	6·18	5·24	5·43	5·40
22 ...	6·17	5·25	5·42	5·40
23 ...	6·16	5·25	5·41	5·41
24 ...	6·14	5·26	5·39	5·41
25 ...	6·13	5·27	5·38	5·42
26 ...	6·13	5·27	5·38	5·42
27 ...	6·12	5·28	5·36	5·43
28 ...	6·11	5·29	5·35	5·43
29 ...	6·9	5·29	5·34	5·44
30 ...	6·8	5·30	5·32	5·44
31 ...	6·7	5·31		

Phases of the Moon.

			H.	M.
3 August ...	●	New Moon ...	8	17·2
10 „ ...	☽	First Quarter ...	16	24·2
18 „ ...	○	Full Moon ...	18	3·3
25 „ ...	☾	Last Quarter ...	23	4·5
1 September	●	New Moon ...	17	19·4
9 „	☽	First Quarter ...	10	14·9
17 „	○	Full Moon ...	6	23·4
24 „	☾	Last Quarter ...	4	31·5

IMPORTANT NOTICE.

As several remittances in coin have been forwarded to the Department in payment of twelve months' postage of the *Journal* without registration of the letters containing such coin, the Postal Authorities have charged THREEPENCE for registration. It is, therefore, requested that those who have failed to register their letters will remit the amount named, otherwise the *Journal* will only be forwarded for nine months from 1st July.

Grain Elevators.

[WITH OVER FIFTY ORIGINAL ILLUSTRATIONS.]

BY N. A. COBB.

(*From the Agricultural Gazette of New South Wales.*)

NOTE.—The writer's object in the following pages has been to collect together and augment his previous articles on the subject of elevators, and explain fully to those who do not yet understand them the simple principles of the elevator system.

When I see a farmer go to his nearest market town, several miles distant, pay 5d. each for bags by the wagon-load, take them home, and put them away in a dry place until wanted, then once more carry them out to the field, fill them with grain, sew them up, and, if he is a careful man, label each bag separately, lift the bags of wheat on to a high dray, take them to his barn, unload them, stack them, and then later on lift them down again, rip them open, clean the grain by machinery, bag it up again, label the bags again, and stack them once more until such time as the market price suits him; when I see him, having made a sale, unstacking them once more seve l weeks later, sewing up the holes the mice have gnawed meanwhile, lifting the n again on to his high dray, and off again, one by one, at the railway shed; when I see the grain leaking out through bursted, torn, and gnawed bags all the way from the railway-shed to the seaboard; when I see bags of precious grain, representing the income of farmers in all parts of the country, standing days at a time exposed to the wet weather and losing value—simply because grain in bags cannot be handled fast enough to prevent a glut at the metropolitan or other central market; when I see valuable property, such as railway trucks, standing idle day by day, letting interest on the people's money go to waste, because these trucks cannot be loaded with bags of wheat quickly and despatched to their destination; when I see thousands of bushels of uncovered bags of wheat caught in a shower; when I see the wheat, after several hundred miles' railway journey, unbagged and put into fresh bags before transhipping, because the original bags are worn out; when I see them again lifted, and lifted, and lifted slowly into the ship's hold; finally, when I lean back with a shudder and try to imagine the high old time the ship's rats and the weevils have among this honeycomb of bags of wheat—a picnic lasting, it may be, several months—until the grain is at last unloaded in London and shot into an elevator—when I see all these things I cannot find words powerful enough to stigmatise this universal use of bags. Because this thing is wrong in principle, and can be remedied.

The secret of the remedy—no, it's no secret; it is fairly written against the sky in scores of the greatest and most prosperous towns in America and Europe. Not the secret, then, but the principle of the remedy is this: *threshed grain can, in a large measure, be handled like water.* It will run, it can be poured, it can be pumped; and if only our farmers, merchants, and railway architects will take pains to consider this simple idea, the result will be a change in our methods of handling grain, beginning in the field and ending at the mill.

What would you think of a man who lifted all the water out of his well in a bucket instead of with a pump? What would you think of a man who lifted all the water out over the edge of a tank instead of letting it run out through the faucet at the bottom? What would you think of a man who habitually carried water downhill instead of letting it run through a spout! What would you think of a man who, having 400 gallons of water to transport, put it into 400 one-gallon receptacles instead of into one 400-gallon tank? What would you think of a man who caught his roof-water in an underground tank, so as to

have the pleasure of pumping it up again when he wanted it for use? What would you think of a man who preferred to store his water in a way that not only allowed but actually invited various sorts of vermin to injure it, and cause it to leak away? The English language is hardly strong enough to tell how big a fool such a man would be.

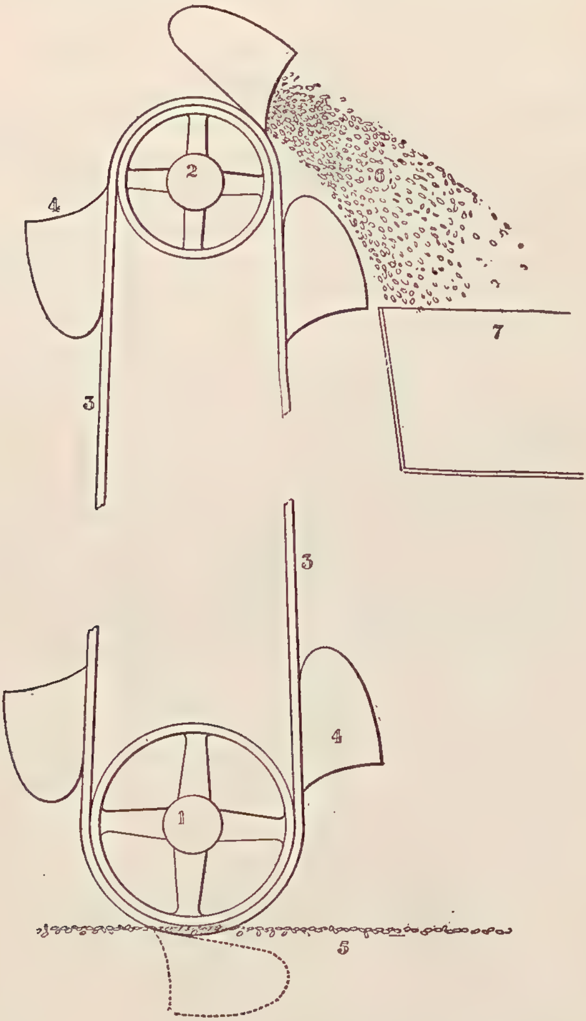


Fig. 1.—Rough diagram to illustrate the action of an elevating belt. The pulleys 1 and 2 carry an endless band, 3, to which are riveted buckets, 4. As the buckets pass round the lower pulley they dip into the grain, 5, and fill themselves. As they pass over the upper pulley they shoot the grain into a trough, 7. The distance from the lower pulley to the upper is over 100 feet in the largest elevators.

Yet, observe how grain is handled in Australia. It is lifted by hand, when to lift it by simple and inexpensive machinery would be both easier and cheaper. It is lifted over the edges of receptacles instead of being allowed to run out of them at the bottom; it is habitually carried downhill instead of being allowed to run of its own accord. When being transported by the thousand bushels, it is cooped up in 4-bushel receptacles. It is everywhere put down so as to be lifted again by hand at the next handling. It is preferred to store it in a way that not only allows but actually invites various vermin to injure it and cause it to leak away.

Why not introduce the elevator system of handling grain, as has been done in America and Europe?

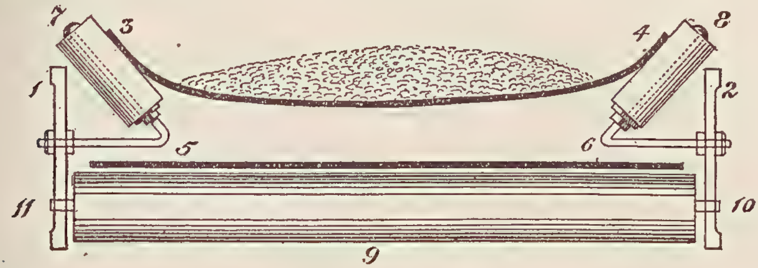


Fig. 2.—Cross-section of a horizontal grain-belt taken near one of the pairs of oblique rollers used to keep the edges of the belt somewhat raised.
1 and 2, sides of the long framework.
3, 4, edges of the belt.
5, 6, returning portion of belt.
7, 8, oblique rollers for turning up the edge of the belt.
9, rollers for support of 5, 6.
10, 11, bearings of the rollers 9.

The grain elevator, as its name indicates, is a contrivance for raising grain from a given position, generally near the ground, to a higher position, generally a bin or silo, from which it can at any moment be delivered conveniently and quickly by means of proper machinery.

The essential elements of the grain elevator are :—

1. The elevating and transferring machine.
2. The weighing machine.
3. The bins or silos.
4. The cleaning machine.

The elevating machine is built in a great variety of forms, all, however, embodying the same principle, if we overlook the pneumatic elevator, which we may do for the present.

An endless band passes round two pulleys, one of which is placed above the other, and this endless band carries buckets which, on passing round the lower pulley, dip into grain contained in a hopper, and, on passing round the upper pulley, shoot the grain that has been dipped up into a receiving hopper or spout. See diagram in Fig. 1.

The grain thus elevated may be weighed in special machines adapted to receiving spouted grain, and which automatically register the weights. These machines are usually located at the top of the elevator building.

Before or after weighing, usually after, the grain is carried to its destined bin or silo by means of horizontal belts, or inclined spouts, or a combination of both. The belts are made of canvas, leather, rubber, or a composition, and vary in width from 1 foot to 3 feet, and, while usually running horizontally, may have a grade of 1 in 10, and yet work satisfactorily. A spout conducts the grain on to the middle of the moving belt, which latter receives an upward curvature at its edges through the use of pairs of oblique rollers every 15 to 30 feet, according to its width. Such belts are shown in illustrations 3 and 5, and a diagrammatic cross-section is given in Fig. 2.

The grain-belt delivers its grain into hoppers or spouts, either at its turning point or at an intermediate point, by means of a special carriage which zig-zags the belt as shown in Fig. 5.

The terminal elevators now in process of construction in the United States are costing about 30 cents per bushel of capacity. Previous to the recent advance in price of all kinds of material, terminal elevators were built at from 20 cents to 25 cents per bushel. I have seen (and examined in many cases) many hundreds of elevators in all parts of the United States, and among them all have seen but one with iron bins. They must be uncommon. The large terminal elevators are seldom completed in less than twelve months; the smaller

ones (100,000 to 200,000 bushels) may be contracted for at half the above time limit. As to particulars of most modern machinery, very much may be said. In general the grain-cars are run into the elevator and unloaded by means of steam-shovels—which are large scoops worked by means of rope tackle and a steam winch, the scoops being dragged empty to the ends of the car by hand, and then hauled back by steam, thus bringing the grain out in the course of a few minutes. The grain falls through an iron grating of about 4-inch mesh, designed to catch coarse materials, and to prevent accident, and then goes down into the hopper, into which the elevator buckets dip (see Fig. 3). The buckets, of which there are a variety of good makes, hold about half-a-bushel, and are attached to an endless band, which passes to the top of the elevator; here the buckets, turning to begin their downward trip, empty themselves into the weighing-bins. These are so constructed as to be under the control of one man, who does the weighing. The bookkeeper has his office near the weigher, and works in conjunction with him. An automatic signal warns the weigher when the weighing-bin is nearly full, and he, by moving a lever, starts the grain to running into a second duplicate weighing-machine, during the filling of which he weighs and records the first, and starts

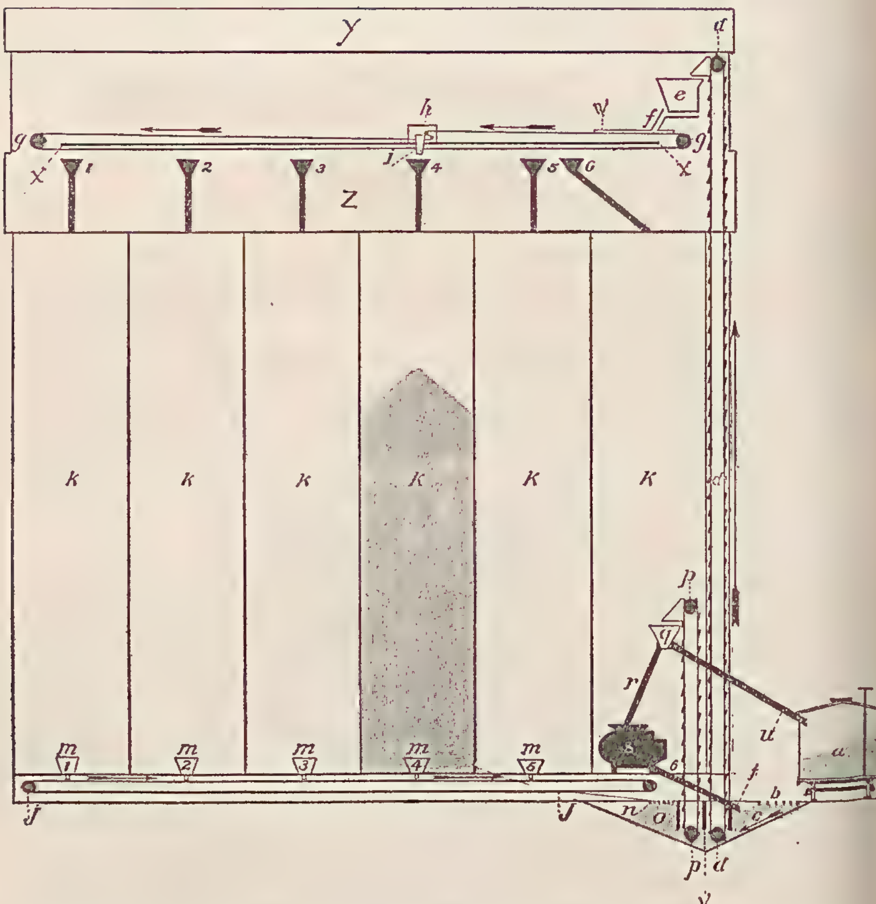


Fig. 3.—Diagram of an elevator. *a*, car with grain; *b*, grating over the hopper, *c*; *c*, hopper; *d, d*, pulleys carrying the endless band and elevator buckets; *e*, weighing-bin; *f*, *w*, delivery spout to grain belt; *g*, *g*, grain belt; *h*, zig zag, which is moveable back and forth on the track, *x x*; *i*, spout; *k k k*, bins or silos, to which the spouts, 1, 2, 3, 4, 5, 6, deliver grain; *m m m*, mouths of the bins or silos; *l l*, carrying-belt delivery into the hopper, *o*, through the grating, *n*; *p p*, secondary elevator delivering to hopper, *q*, whence the grain may go to the cleaner, *s*, *via r*, or to the car, *via u*; *y*, *z*, location of the roofs of the elevator.

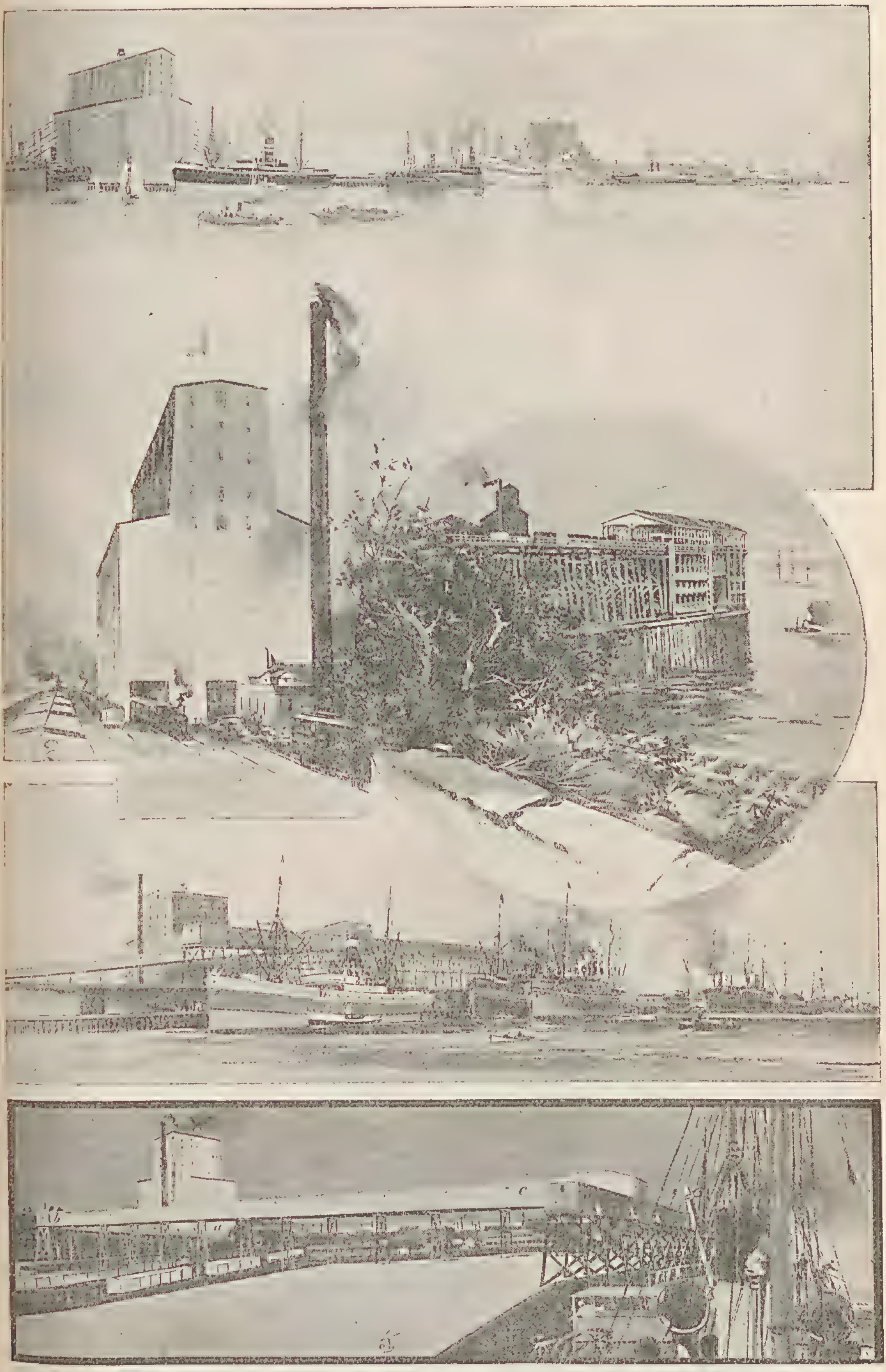


Fig. 4.—A general view of the terminal elevators at Galveston, Texas, U.S.A.; 2, near view of the elevator shown in the extreme distance in No. 1—a grain train is seen, just leaving the elevator; 3, coal elevator at Tacoma, Washington, U.S.A.; 4, general view of the elevator shown in No. 2, showing the long covered grain belts reaching from the elevator to the wharf, a distance of several hundred yards; 5, view of the same elevator from the top of a ship's mast.

The courses of the grain belts are indicated by the letters *a*, *b*, *c*, *d*, passing over railways, storehouses, and other buildings.

it to emptying itself into its assigned elevator bin. When the duplicate weighing-machine is full, the first is empty, and so these weighing-machines work along alternately. In the largest elevators a more elaborate system of the same nature is used. The weighing-machines are made by the principal scale-makers. The weighing-bins and other machinery in the top of a wooden elevator are supported on a different structure (separate) from the bins. The sides of these latter, in large elevators, vary in height several feet, according to their state of dryness, and are not a fit basis for the support of shafting, &c. This great expansion and contraction of the walls of the bins is a peculiarity of wooden elevators; brick and steel bins are more stable.

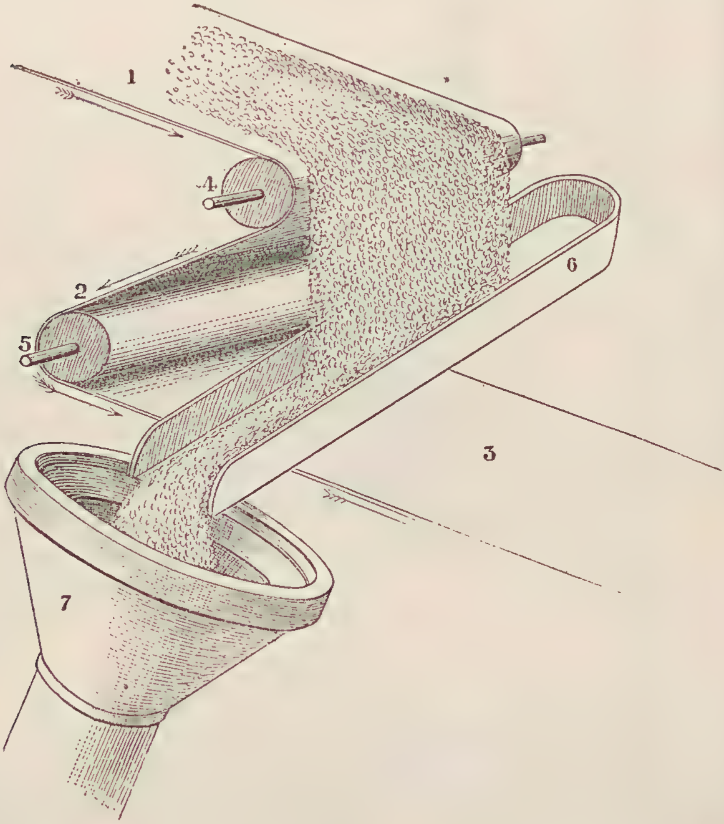


Fig. 5.—Diagram of a "zig-zag." The grain-carrying belt is shown at 1, 2, 3, and the direction of its motion is indicated by arrows; 4 and 5 are pulleys used to zig-zag the belt. The grain is shot into a trough, 6, which empties into a spout, 7, leading to a bin or elsewhere.

The grain is spouted from the weighing-machines to any desired bin by means of belts and various ingenious spouts, the best spout I have seen being the design of E. D. Mayo, of Minneapolis. This is an elbowed revolving iron spout, with a high degree of adjustability. A circular steel track 12 feet in diameter is hung from the ceiling under the weighing-bin, concentrically with the mouth of the bin. A light and simple steel carriage running on this circular track supports the lower end of the iron spout, which runs out at an angle of 45 degrees from the mouth of the weighing-bin. This spout, therefore, revolves in a circle, and can be pointed in any direction; and attached to its lower end is a second long iron spout, with adjustable joints. The lower end of this latter rests on the floor containing the trapdoors leading to the various bins, and this lower end being on castors the spout can be easily dragged by hand and placed over any trapdoor within a radius of 15 or 20 feet.

The grain is generally cleaned and graded on one of the lower floors of the elevator by means of machines having a capacity of 1,000 to 2,000 bushels per hour; prominent among which I may mention the "Monitor" Wheat-cleaner, made at Silver Creek, N.Y. Wherever, in a large elevator, the grain is carried in a horizontal direction it is emptied on to a belt—flat, and about 3 feet wide—which runs horizontally, and is animated by means of pulleys run by an endless cable. This cable system runs in all directions throughout the elevator, and sometimes for a good fraction of a mile outside. Wherever it goes, its main object is to animate a series of wide, grain-carrying, horizontal belts. Sometimes, by means of an elevated outdoor system of this kind, grain is carried several hundred yards over the tops of buildings and warehouses to the ship's docks. (See Fig. 4, Elevators at Galveston, Tex.)

Whenever it becomes necessary to transfer the grain from a belt to a spout (as at a ship's side), a device is introduced by means of which the belt is zig-zagged and the grain is caught in a hopper and so spouted. Fig. 5 is a diagram showing the nature of one of these zig-zags. The zig-zags are a permanent feature of all large belts from which grain is spouted; and the best of them are on ways, and adjustable along the belt by means of hand-cranks.

The bins of wooden elevators are made of timber, 2 inches by 4 inches to 2 inches by 8 inches, spiked flatwise. The large terminal elevators, having bins often upwards of 75 feet deep, require 8-inch timber for the lower parts of the bins where the thrust is greatest; and this, among other reasons, adds to the relative cost of such elevators when compared with those of smaller size. The number of bins per elevator varies widely, according to the class of business, sometimes reaching 200 or 300. Large elevators often have bins of 50,000 bushels' capacity and upwards. These hold grains of various grades, various kinds, various seasons, various owners, &c., &c.

These are, in general terms, the features of the most recently-built terminal elevators in the United States. The exterior appearance of some of these elevators is very well shown in the accompanying photographs, which I have taken, as opportunity offered, in my various visits to the great wheat-handling centres of the world. Of such elevators there are some 200 in the United States, located principally at Chicago, Minneapolis, Duluth, and Buffalo. A one-million bushel elevator requires engines giving 125 to 200 horse-power, according to circumstances.

Fig. 6.—Typical up-to-date American country elevator built of wood. *a*, Power-house, containing gasoline engine; *b*, Receiving office; *c*, Entrance; *d*, Exit; *e*, Top of elevating belt; *f*, Grain-cars receiving grain.

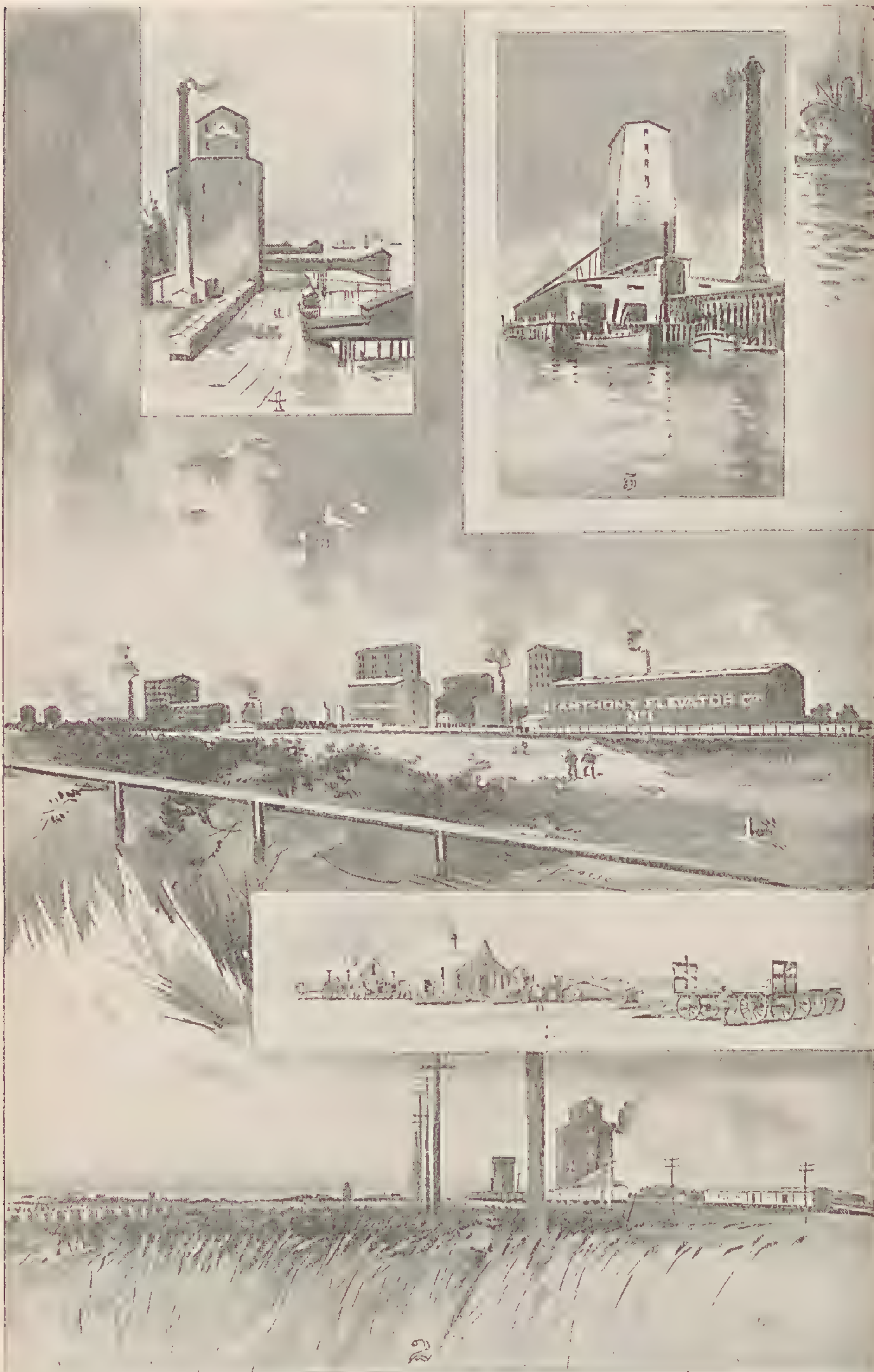


Fig. 7.—1, ten large terminal elevators taken in one view at Minneapolis, Minn., U.S.A.; 2, view on the Dalrymple farms at Fargo, North Dakota, the nearer elevators belonging to the farms, the far ones to the companies operating at the town of Fargo—at the right, are seen several cars being loaded from wagons driven up on to an elevated platform; 3, machinery headquarters of one of the Dalrymple farms, showing wagons arranged for carrying sheaves of wheat—these sheave racks are removable, and, later on, are replaced by the boxes as described on another page; 4, terminal elevator at Tacoma, on the Pacific Coast of the United States; 5, large terminal elevator at Seattle, on the Pacific Coast of the United States.

The country elevators, such as are used in the principal wheat areas of the United States, have a capacity of 20,000 to 40,000 bushels, and are constructed at from 15 cents to 20 cents per bushel, according to size—20 cents for the smaller size and 15 cents for the larger size. These are now often fitted with gasoline motors instead of steam. These elevators, as a rule, do not admit cars. Those of older construction do not even admit teams. An outside platform (often roofed over) receives the grain-wagon upon a platform scales, and the load and the wagon are weighed. Without moving, a slide in the side of the wagon is pulled, and the grain runs from the wagon into the receiving hopper. When the wagon is empty it is weighed, and this weight subtracted from the first weighing equals the delivery. In the more newly-constructed country elevators provision is made for driving grain-teams through the elevator. The illustration on page 143 shows admirably the general form of an up-to-date American country elevator.

The elevating and cleaning machinery are the same as for the larger elevators already described, only on a smaller scale. According to my observations, there are between 15,000 and 20,000 of these elevators in the United States, some single States containing nearly 2,000. These elevators are owned by various elevator companies, which compete with each other in the liveliest fashion. The country elevators are the main feature of the American elevator system. They handle all the wheat raised east of the Rocky Mountains, and some of that raised on the Pacific Slope, while the terminal elevators of large size handle only the grain that is exported. Very much more capital is invested in these country elevators than in the large terminal elevators. I have seen scores of small towns having three to four of these small country elevators each—in fact, this is about the average number per railway depôt in North Dakota and North Minnesota. Plenty of country towns contain six or seven, and I am informed that the little town of Eureka, South Dakota, possesses no less than thirteen. Of course, each elevator under such circumstances represents a different owner, except where, as is not seldom the case in larger country towns, one company has two or more elevators in the same town.

Grain-wagons.

Many small producers in the more thickly populated parts of Minnesota and other North-western States carry their grain to the elevator in bags on any suitable wagon. They have, of course, to unbag it themselves at the elevator.

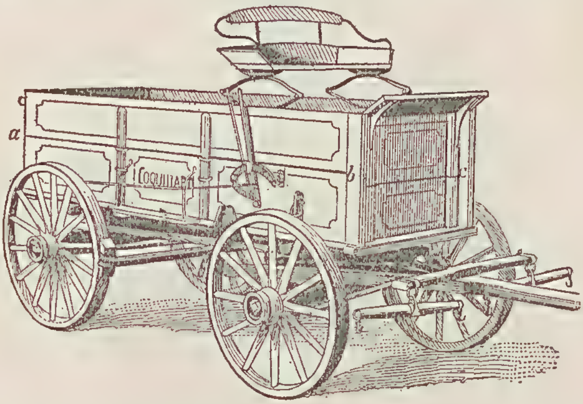


Fig. 8.—Typical grain-wagon as used in Minnesota, Dakota, and other middle United States where wheat and maize are the chief products. The side-boards of this wagon are easily removed. The top halves of the sside-boards are removable separately. That part above the line *a*, *b*, *c*, can be so removed, thus converting the wagon into a kind of express wagon. The back end of this wagon is provided with a small slide door, through which the grain in the wagon will run out when required.

The larger producers in the less thickly populated districts carry their grain in "tank-wagons," as they are sometimes called. This method of transportation is considerably cheaper than that mentioned above. These grain-wagons, having a capacity of 1 ton to 3 tons, can be bought for about 50 dollars. The top boards are removable, leaving the wagon in shape for other farm work. The price of labour, horses, feed, and wagons being about the same as in New South Wales, and the roads and distances being about the same in those parts where these special wagons are used, the price per mile for haulage is about the same as in New South Wales.

Instead of buying a ready-made grain-wagon, some of the most successful producers of wheat build long boxes, 4 feet by 4 feet by 12 feet, and at threshing-time these are bolted on to the same wagons that at reaping-time are used for hauling sheaves. This seems to me the most practical of all the ways I have seen. The boxes are of common matched board, and are kept from bulging by frame-work at the ends and in the middle. The top and bottom pieces of the frames are 2-inch by 4-inch scantling, and the side pieces are iron rods $\frac{1}{4}$-inch by 1 inch, held with nut and screw. Such simple boxes can be built

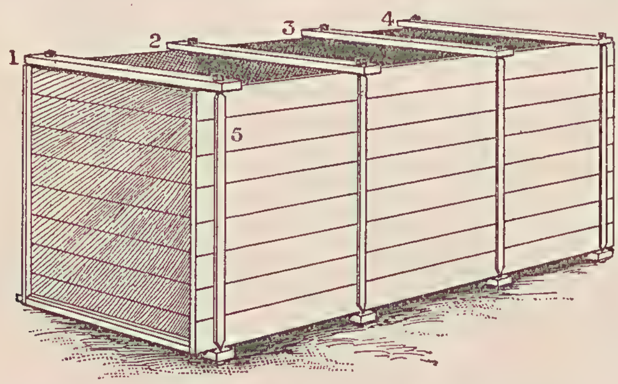


Fig. 9.—Wooden box such as is provided by farmers in the United States for carrying loose grain from the field to the elevator. This box is made of $\frac{7}{8}$-inch matched pine. 1, 2, 3, and 4 are pieces of pine 2 inches by 4 inches, and are held in place by flat iron rods 1 inch by $\frac{1}{4}$-inch, each rod having a thread and nut at both ends, as shown at 5. These boxes range in size up to 4 feet by 4 feet by 12 feet. The farther end of this box carries a slide door near the bottom, from which the grain in the box runs out when required. This box is to be bolted on to a wagon or dray.

for a little more than the cost of the material, and leave the running part of the wagon free for a wider variety of uses on the farm than would otherwise be the case, and may be built to fit any wagon or dray.

Grain-cars.

The ordinary American freight-car is of box form, having two sliding doors on opposite sides at the middle of the car. Several styles of these cars are frequently pictured in these pages. The width of these cars is 9 feet overall. The inside dimensions are 29 feet to 34 feet by $6\frac{1}{2}$ feet to 9 feet by 8 feet (width). They are made in a variety of forms, with or without air-brake, with a variety of running gear and to carry from 20 to 35 tons, sheathed inside or not (the latter seldom), &c. When made for the so-called grain-lines they differ but little from the cars on lines that carry miscellaneous freight—in fact, the bulk of the grain-crop is transported in a few weeks, and all railway lines find it better to use a general purpose car. The accompanying plates, numbered 10 to 15, show in detail the peculiarities of these grain-cars as used on half-a-dozen different American railroads. The dimensions, weight, and capacity of each style are given, as well as the cost. The prices are for the spring of the year 1900. It is necessary to bear this in mind, as the prices vary somewhat with the price of materials. A carload is reckoned at 800 bushels.

Fig. 10.—New York Central Box Car. $900.

Capacity	60,000 lb.	Sill to plate	6 ft. 11 in.	Height, floor to carlin ...	7 ft. 1¼ in.
Length over sills ...	35 ft.	Length inside ...	34 ft. 4¼ in.	Height at eaves	11 ft. 5¼ in.
Width over sills ...	8 ft. 10 in.	Width inside ...	8 ft. 3¼ in.	Width at eaves ...	9 ft. 6¼ in.

Charges.

In general, the country elevators buy direct from the farmers. Where grain is taken, graded, and stored for the farmer, the charges vary in different localities. For terminal elevators in the States of Minnesota, Wisconsin, and Illinois, the average charges are $\frac{3}{4}$ cent for receiving, $\frac{1}{2}$ cent for cleaning, no charge for shipping. These rates include fifteen days' storage free; $\frac{1}{2}$ cent per bushel is charged for every fifteen days' additional storage. That these prices show a profit is proved by the number of elevator companies competing for grain at these rates. No doubt, with a trade of less magnitude the charges would have to be higher. The storage practice among country elevators differs considerably with the locality, the chief variation being in the receiving charge, the other charges being much as in terminal elevators.

On receiving wheat for storage, the elevator agent issues to the owner of the wheat a storage check, of which the following is a sample, both as to size and matter:—

G. W. VAN DUSEN & Co.

No............ ....Minn.,.................................189

Received in store of

....Bushels No............Wheat
60

Which amount and same quality by grade will be delivered to the person named herein, or to the lawful owner hereof, or his order, as provided by law, on payment of lawful charges.

The established maximum rates and charges for receiving grain, insuring, handling, and storing same fifteen days, and delivering, is 2 cents per bushel.

Storage after the first fifteen days, $\frac{1}{2}$ cent per bushel for each fifteen days or part thereof for the first three months; after the first three months, $\frac{1}{2}$ cent per bushel for each thirty days or part thereof. If grain is cleaned at owner's request, $\frac{1}{2}$ cent extra per bushel.

This grain is insured for benefit of the owner.

............bu...............lbs. gross G. W. VAN DUSEN & Co.,
Owners or Lessees.

............bu...............lbs. dockage.

By..
Agent.

............bu...............lbs. net.

On presenting this check at a future date, the owner of the wheat is entitled to receive for his wheat the market price ruling at the moment of presentation. Storage checks may be offered and are accepted as security in case the farmer wishes to borrow money while waiting for a rise in the market price of his grain. Often country elevators set a maximum charge per annum for storage, as 6 cents, and when, at the rate of $\frac{1}{2}$ cent for each fifteen days, the charges reach 6 cents, they cease for the year.

Inspecting, Grading, and Weighing.

Mr. John Mathieson, Railway Commissioner for Victoria, has recently returned from a trip to America and Europe, undertaken at the instance of the Victorian Government, and with a view to inquiring into the working and construction of grain elevators. In his excellent and valuable report, in which he gives a qualified approval of the elevator system for Victoria, he says, concerning the inspection and grading of grain at terminal points:—

"*Inspection and Grading at Terminal Points.*

"Grain is brought to Duluth by nine large railway systems, each of which is provided with a yard located outside city limits, where inspectors are stationed to intercept and inspect grain on its arrival from farming districts.

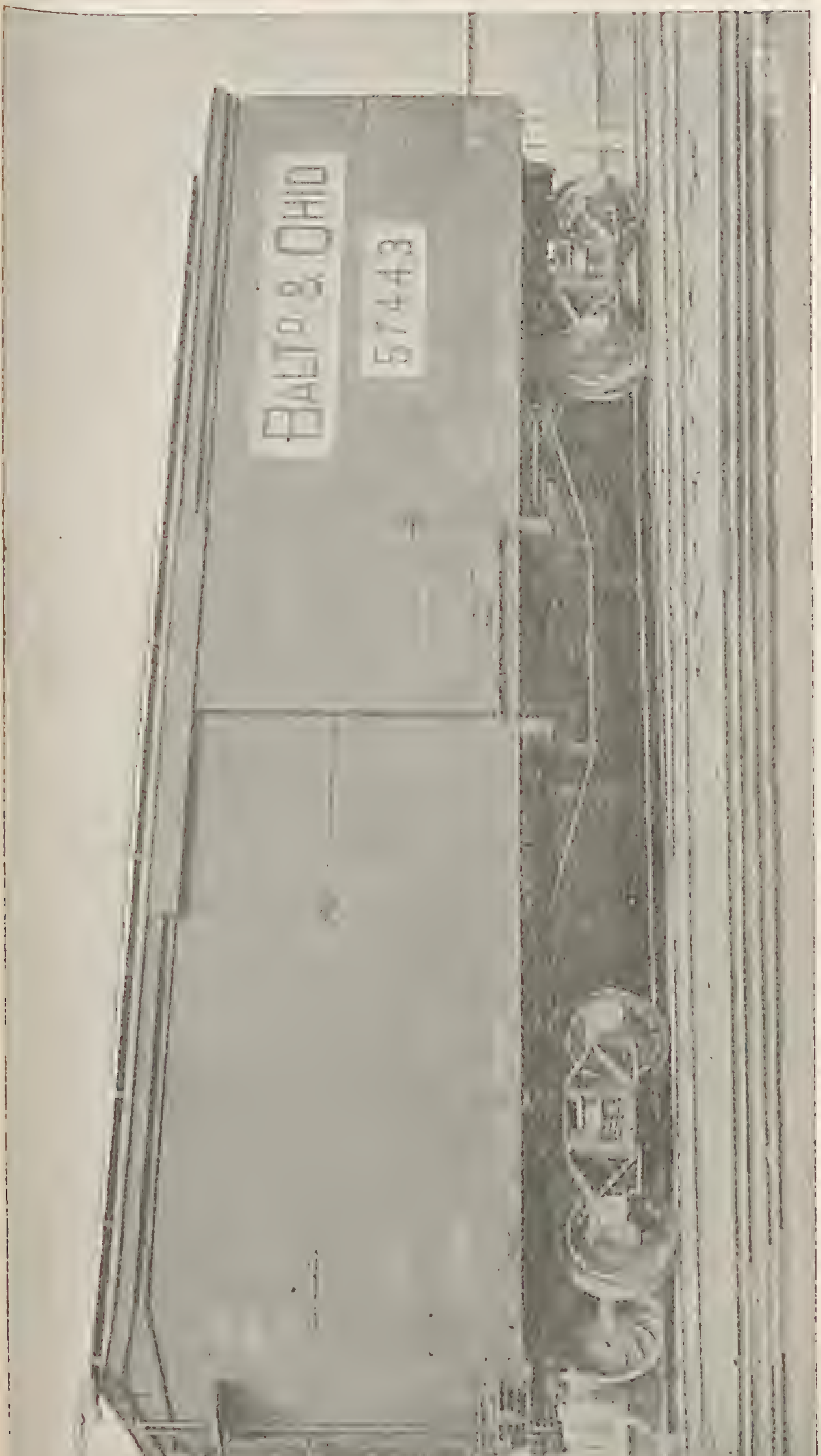


Fig. 11.—Baltimore and Ohio Box Car. $925.

Capacity	60,000 lb.		Sill to plate...	7 ft. 5$\frac{1}{2}$ in.		Height, floor to carlin ...	7 ft. 7$\frac{1}{4}$ in.
Length over end sills	36 ft. 10$\frac{1}{2}$ in.		Length inside	36 ft.		Height at eaves ...	12 ft. 5$\frac{1}{2}$ ft.
Width over side sills	8 ft. 10 in.		Width inside	8 ft. 2 in.		Width at eaves ...	9 ft. 8 in.

"All consignments to be dealt with locally are inspected, graded, and weighed by the State inspectors and weigh-masters. Grain consigned to points beyond is not interfered with. The course followed is as under :—

"On arrival of the cars, they are placed by the railroad companies upon inspection tracks, provided for that purpose in their respective yards. In each of these yards the deputy inspectors, with their helpers, are on the ground early each morning, winter and summer, regardless of weather, prepared to enter upon their duties as soon as it is light enough to see. They are assisted by helpers, one of whom begins the day's work by breaking the railroad seal on one side of the first car and throwing the car door open, after recording the number and initials of the car and the number of the railroad seal broken by him. If there be any appearance of leakage from any part of the car, this is also noted. Passing along the line of cars, the helper continues his work until all the cars which have arrived during the night (sometimes from 150 to 200 or more) have been properly opened.

"Following him come the samplers who represent the commission firms on the Board of Trade, and make it a point to procure from each car a sample of the grain consigned to the firms they represent, so that the consignments of country clients may be disposed of by sample as well as by grade. In this way an advance over the regular grade price is frequently secured.

"Commission merchants make it a practice to carefully preserve the samples obtained for a period of thirty days, after which, if no question has arisen, they are usually disposed of, it being presumed that no necessity for reference will arise after that time has elapsed.

"As the cars are opened, the deputy inspector, with the aid of a second helper, carefully examines the grain in each, so as to determine its proper grade and the amount of the deduction to be made for dirt, &c., technically known as 'dockage.' To enable this to be done, the helper pushes a long brass probe into several places in the grain, under the direction of the inspector, who stands on a ladder at the door opening. With the probe the helper each time draws up a section of the wheat from top to bottom, and brings it to the inspector for examination. From the samples thus obtained the grade is determined. The dockage is fixed on the judgment of the inspector when, in his opinion, it does not exceed $1\frac{1}{2}$ to 2 lb. per bushel, but beyond this it is arrived at by careful test with a scale and No. 10 sieve. Great care is exercised by the inspector in the performance of this duty to see that no injustice is done to either the seller or the buyer, as the wheat must be cleaned before it can be shipped to eastern markets, and it is important that the dockage should be as nearly correct as possible, so as to insure proper cleaning and delivery from the elevator in an acceptable condition. The established rule to govern the inspector in arriving at the true dockage is as follows :—

In inspecting wheat that has not been properly cleaned, the track inspector shall determine and shall state upon his inspection ticket the number of pounds per bushel, or fraction thereof. that in his judgment will be a just and proper allowance for cleaning the same wheat to the grade fixed upon it by the said inspector if cleaned in a public warehouse under State supervision; provided, however, if said wheat contains such an excess of dirt or foul seed that the inspector cannot correctly adjudge the amount thereof, he shall determine, by actual test with suitable appliances, the average amount of such dirt or foul seed per bushel that it will be necessary to deduct for properly cleaning such wheat to the grade fixed upon it by him, and when such deduction has been determined it will be plainly stated upon the inspection ticket.

The owner, or agent of the owner, of any lot of grain so ordered cleaned shall have free and full access to such lot of grain during the process of such cleaning.

The grain shall be weighed before and after such cleaning by a State weighman. The result of such cleaning shall be final and binding upon all parties. The charges for cleaning wheat in any public elevator or warehouse shall not exceed $\frac{1}{2}$ cent per bushel.

"In the case of each carload, the inspector records in his book the car number and initial, the grade, dockage, test, weight, and reasons for making the grade, and attaches a card to the car door giving similar information.

Fig. 12.—Lake Shore and Michigan Southern Box Car. $925.

Capacity	60,000 lb.	Sill to plate	7 ft. 6 in.	Height, floor to carlin ...	7 ft. 5¾ in.
Length over sills	34 ft. 9 in.	Length inside	34 ft. 0½ in.	Height at eaves	12 ft. 2¼ in.
Width over sills	8 ft. 9 in.	Width inside	8 ft. 2¼ in.	Width at eaves	9 ft. 6½ in.

"The inspectors in determining the grades are supposed to know absolutely nothing as to the point from which the grain came, or who the shipper or consignee may be, nor would it be easy for them to obtain the information. It would also be impossible to furnish such information from the inspection office, as the only record to be found there is the car number and initials, the date of inspection, name of inspector, the grade and dockage, and the inspector's notations or reasons for his grade. By this means, strict impartiality is maintained respecting the inspection, and the grading of each car is fixed without knowledge of its origin or ownership.

"Inspection certificates are furnished in all cases when requested, whether applied for in person or by mail; and all the records of the office are open at all times for examination by any one interested.

"We are informed that, though hundreds of carloads of grain arrive each year with good grain on the top of the load and poor or damaged and dirty grain below, it is a rare thing for such cases to escape the observation of the inspector on the track, as the brass plunger which is used for probing the grain generally brings up evidence of the deception. As a check upon such fraudulent dealing, the rule laid down for the guidance of the inspector in such cases provides that—

No inspector shall in any case make the grade of any lot of grain above that of the poorest quality found in that lot when it bears evidence of having been "plugged" or "doctored."

"If, however, by any chance such cases escape the track inspector, they are usually detected by the inspector at the elevator or mill while being unloaded, in which case the attention of the chief deputy inspector is called to the matter, and the grade is reduced in accordance with the rule above referred to. When cars are honestly and evenly loaded, the grades are made as liberal as the rules of inspection will permit, and the benefit of the doubt given to sender in all cases.

"When all the cars have been dealt with, the deputy inspector immediately repairs to the chief deputy inspector's office, where he prepares for his track-book a report of all cars inspected by him. The clerical force of the inspection office is at this time kept exceedingly busy furnishing information, verbally or by telephone, to the members of the Board of Trade respecting the grading, &c., of the contents of the various cars, these particulars being necessary before the grain can be sold and disposed of. In the meantime the helpers, who were left at inspection point, are engaged in carefully closing the car doors and sealing them with State seals, making a record in each case of the seal number and the hour of the day when the seals were attached.

"It is made incumbent upon each inspector to report in writing to the chief deputy inspector all attempts to defraud the system of grain inspection as established by the Railroad and Warehouse Commission or Board of Grain Appeals; all cases where warehousemen deliver or attempt to deliver any grain of a lower grade than that called for by the warehouse receipt; and all attempts of receivers or shippers of grain to instruct or otherwise influence the action or opinion of himself or any other inspector; and the chief deputy inspector must report all such cases to the chief inspector; private inspectors and other persons not connected with the department are not to be allowed in the car during inspection. Deputy inspectors have immediate supervision over all helpers who are assigned to duty under them, and must report to the chief deputy any negligence or inattention on their part.

"During the busy season, when the quantities received are large, the position of deputy inspector is no sinecure. As already stated, his labours commence as early in the morning as the light will permit, and he is kept constantly busy climbing into car after car until his work is completed. He must work rapidly in order to get the report of his morning's inspection on 'Change not later than half-past 10 a.m.; and if he be not thoroughly trained, physically active, and mentally keen and alert, he would, of course, not be able to satisfactorily meet the demands of the position.

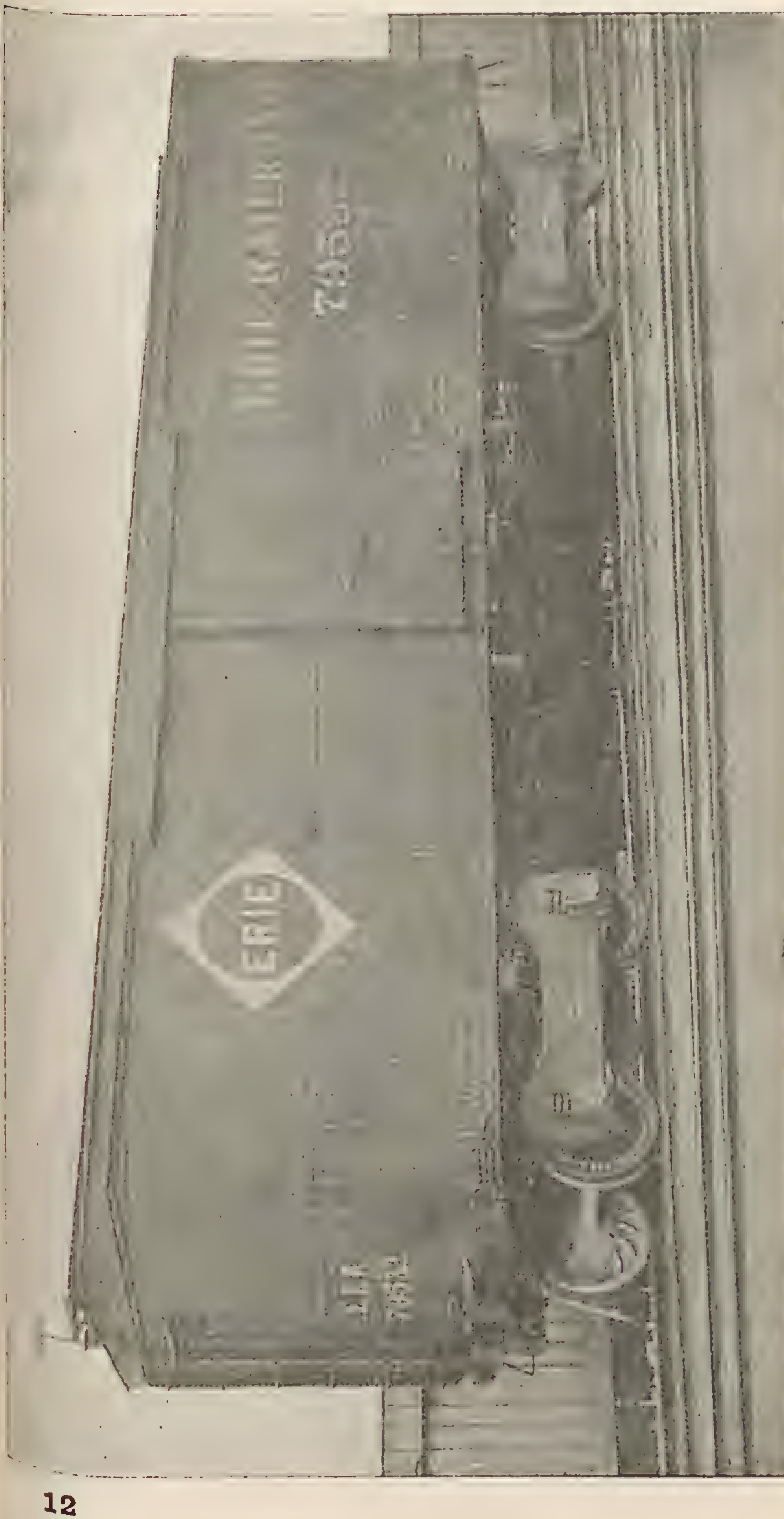


Fig. 13.—Erie Box Car. $995.

Capacity	60,000 lb.	Sill to plate... ...	6 ft. 11 in.	Height, floor to carlin ...	6 ft. 10¼ in.
Length over end sills ...	35 ft.	Length inside ...	34 ft. 4¼ in.	Height at eaves ...	11 ft. 10¾ in.
Width over side sills ...	8 ft. 9¼ in.	Width inside ...	8 ft. 2 in.	Width at eaves ...	9 ft. 7 in.

"*Appeals against Inspectors' gradings.*

"Any person interested in any carload or lot of grain, whether it be the seller or buyer, who may be dissatisfied with the first inspection made by the track inspector, is at liberty to order a reinspection. In the case of a country shipper, this is usually done on his behalf by his commission merchants, and the order must be filed promptly at the office of the chief deputy inspector to prevent demurrage charges, and before the grain has been unloaded and lost its identity by being mixed with other grain similarly graded. This second inspection is made by the chief deputy or his first assistant, in which case a careful examination is made of the carload; and if it be found to be a doubtful case—that is, on the dividing line between the grades—the benefit of the doubt is given, and the grade is raised. If, however, it is apparent that the original grading was right and just under the rules, it is confirmed. In the latter case a charge of 1 dollar per car is made. If the grade is changed, no charge is made for the reinspection, the result indicating that the order for reinspection was justified. If the parties interested still feel aggrieved, they have the right of appeal to the Board of Appeals, whose decision is final and binding on all parties.

"At all terminal points expert grainmen, representing the commission houses, are constantly on the track at inspection hours watching their consignments, and marking cars for reinspection whenever they see a possibility of getting the grade raised. Long experience in the business has made these men excellent judges, and it is a rare occurrence for a carload to get past them, or be graded lower than it is justly entitled to under inspection rules.

"*Operations on 'Change.*

"The samples and grades having been furnished, the business of buying and selling on the Board of Trade begins in earnest. Between 10 a.m. and fifteen minutes past 1 p.m. a busy scene is presented. Buyers flock around the sample tables, first picking out the choice cars, and gradually supplying their needs for the day.

"As fast as sales are made the samples are removed, and by 1 o'clock, unless there is a very dull market, most of the grain is disposed of. The railway companies, which demand prompt disposition of grain by commission merchants and others, particularly in the busy season, in order that they may get the stock emptied and back to the country as soon as possible, are then notified to what mills and elevators the different cars are to be forwarded, and the work of distribution commences. If grain is not disposed of on day of arrival, a demurrage or rental charge of 2 dollars per car per day is exacted.

"*State Weighing.*

"Before any final accounting can be made by the commission merchant to the country shipper, or any settlement arrived at between buyers and sellers in their transactions, the correct weight of the grain must be first ascertained. For the purpose of determining this weight, deputy State weighers are stationed at the terminal elevators and mills, who take charge of the grain on its arrival at their respective stations, and carefully weigh the same before it is delivered into the possession of the buyer.

"At the large elevators an additional or supervising weighman is employed to examine the car on its arrival there. He notes the condition of the seals and whether there is any indication of leakage or evidence of pilfering; in addition he makes careful measurement of its cubic contents, and observes whether or not it is loaded up to the line of the specified capacity. He also watches the unloading of the grain to determine whether proper care is being employed in the process.

"Particulars in regard to these points are entered in a book kept by him, and a report of the same is made to the State weigh-master each day.

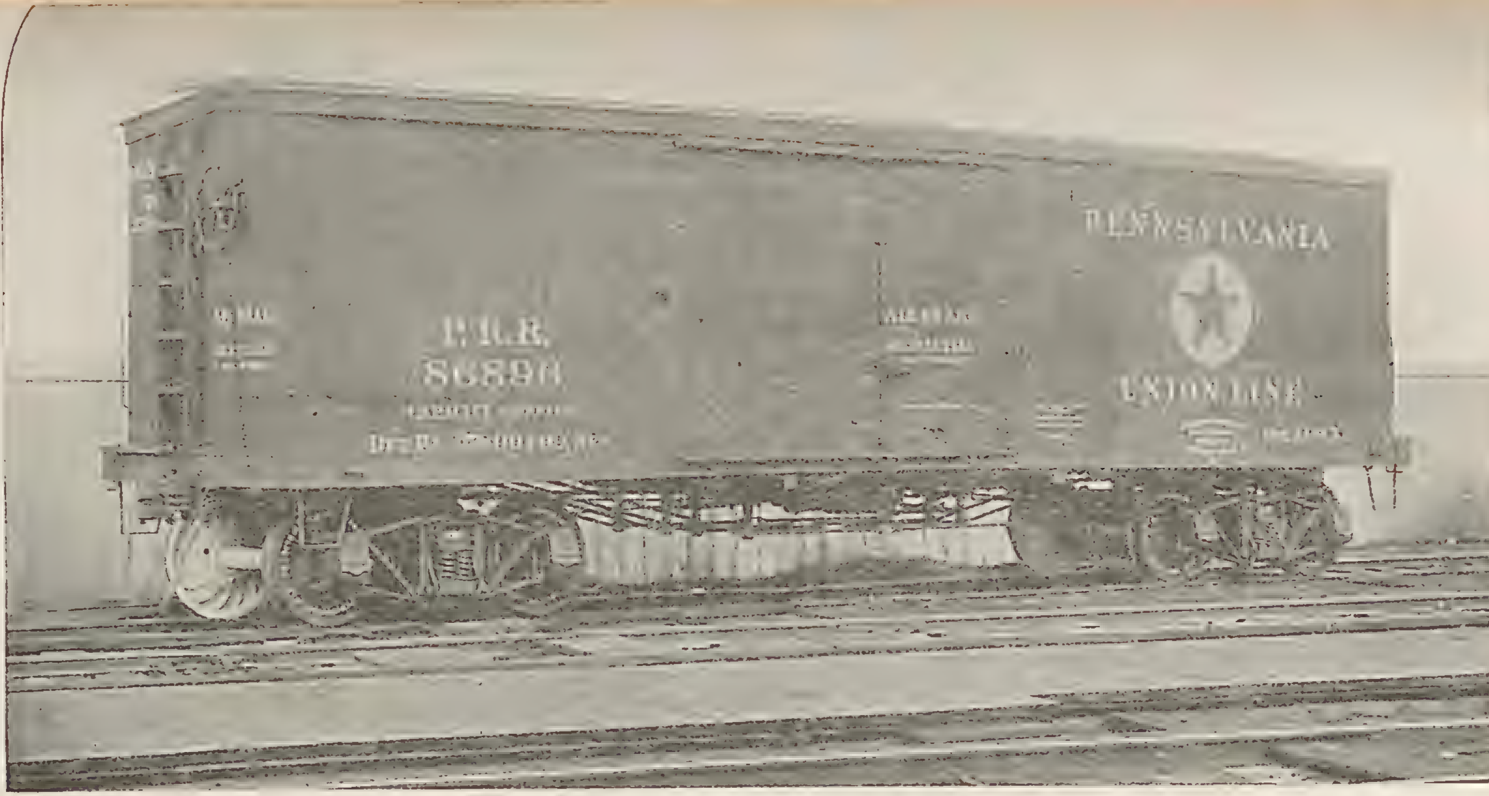


Fig. 14.—Pennsylvania Box Car. $1,035.

Capacity	80,000 lb.	Sill to plate	7 ft.	Height, floor to ridge pole	7 ft. 4¾ in.
Length over end sills ...	36 ft. 4 in.	Length inside	33 ft. 9¼ in.	Height at eaves	11 ft. 7½ in.
Width over side sills ...	8 ft. 11 in.	Width inside	8 ft. 2¼ in.	Width at eaves	9 ft. 6¼ in.

"After the grain is unloaded at the mill or elevated to the hopper at the top of the elevator, it is carefully weighed by the deputy State weigher in charge at that point, and a record is made by him of the gross weight in each case, each day's work being reported in detail at the office of the State weigh-master.

"In the event of a claim being made for an alleged shortage, the record of the supervising weighman and that of the deputy weigher will generally either disclose that the claim is unwarrantable or will furnish evidence that will enable the claimant to enforce payment by the railway company or whoever may be responsible. Certificates of weight, like those of inspection, are freely furnished, without charge, upon application.

"The State Weighing Department, of course, reports only the quantity found in the car at the time it is weighed at the terminal point, and, though errors sometimes occur, they are mostly of a clerical nature, and are almost invariably detected and corrected before a certificate of the weight is issued.

"Actual shortages are usually found to be due either to pilferage or to defects in grain doors or other parts of cars; but discrepancies also arise from defective scales at country stations, or want of care in weighing and noting weights.

"All scales on which State weighing is done are under constant supervision, and receive frequent examination by scale experts employed by the department. At Duluth, it may be added, weighers are employed at eighteen elevators and eight mills.

"Commission merchants and others desiring certificates of weights of their grain can be found crowding the office of the State weigh-master each morning for weights of cars which were sold and disposed of during the day previous. This enables them to complete their account sales for their country shippers. These statements, together with the balances due, are forwarded to the country shipper, as a rule, on the day the weights are ascertained."

I insert photographs of various elevators, which I have taken as opportunity offered. I have seen and carefully examined plans of various elevators, and I am assured that, as soon as the New South Wales Government is ready to offer contracts, American contractors will present plans and offers. One company, which has put up about 1,000 elevators, said to me, "Should matters assume such shape that you think there will be some possibility of entering into a contract with your Government for the construction of an elevator, we should be only too glad to submit in person complete drawings and specifications with definite estimate of the work." (The Barnett and Record Co., Minneapolis, Minn.) The other principal American elevator contractors are Metcalf, Chicago, and Stewart, St. Louis. American contractors have put elevators in various parts of the world—England, the Continent, and Argentina.

Country Elevators.

I desire to emphasise the importance of the country elevators. There are no statistics to show the number of these or their distribution, or the capital invested, and I have therefore endeavoured to gather data on which to base a calculation. Between Fargo, N. Dakota, and Ortonville, Minn., there are country elevators, as follows, on the Chicago, Milwaukee, and St. Paul Railway:—

Town.	No. Elevators.	Town.	No. Elevators.
Wild Rice ...	3	Abercrombie ...	4
Hickson	3	Woodhull	1
Farm Station, near Hickson ...	1	Wahpeton	1
		Fairmount	2
Christine ...	4	———	2
Farm, near Christine	1	White Rock... ...	3

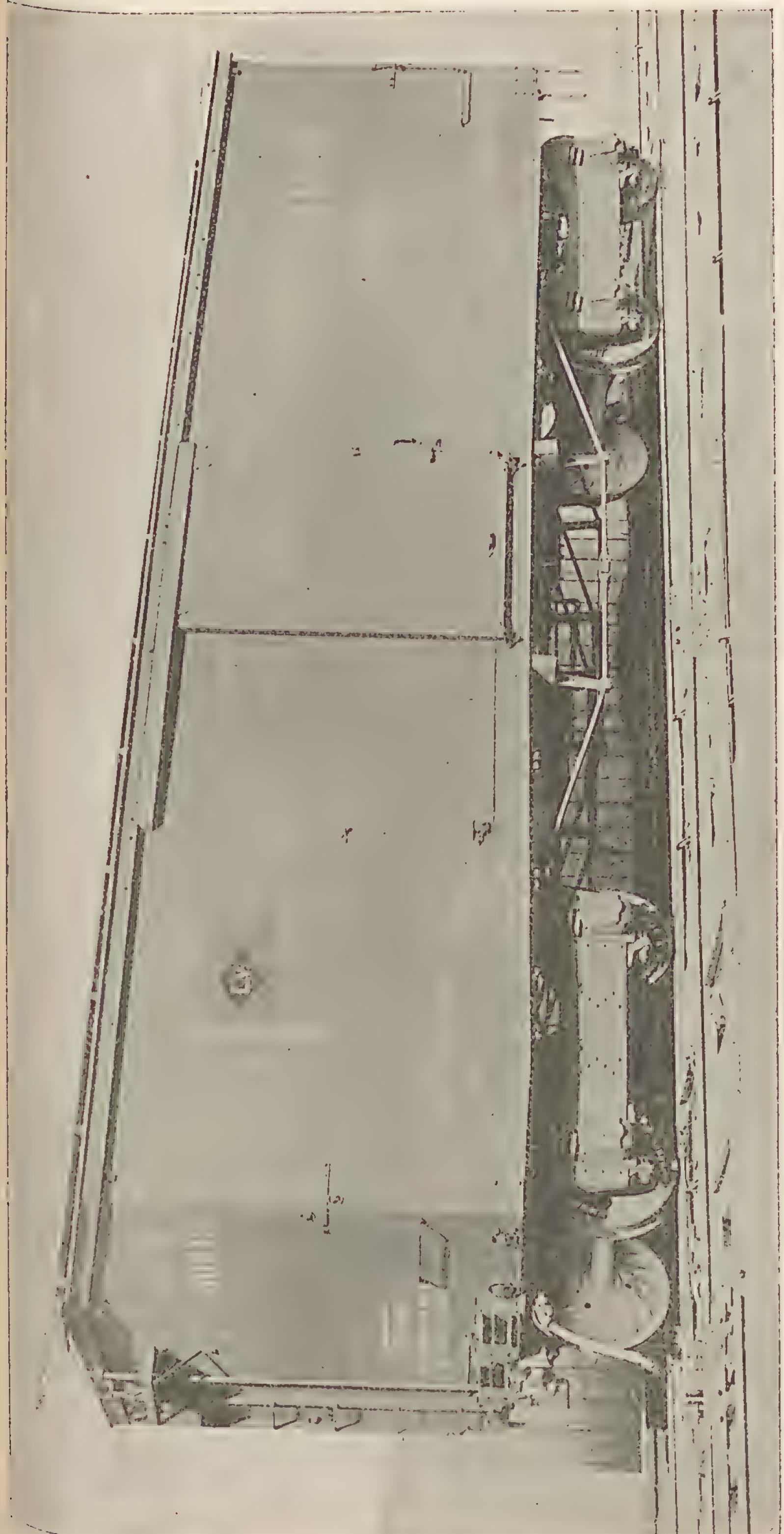


Fig. 15.—Lehigh Valley Box Car. $1,135.

Capacity	80,000 lb.	Sill to plate	7 ft. 1¾ in.	Height, floor to carlin	7 ft. 3¼ in.
Length over sills	34 ft. 10¼ in.	Length inside	34 ft. 0½ in.	Height at eaves	11 ft. 9 in.
Width over sills	8 ft. 9¾ in.	Width inside	8 ft. 1¼ in.	Width at eaves	9 ft. 0 in.

On another occasion, in Western Kansas, I noticed elevators, as follows, in successive towns:—

Town.	No. Elevators.	Town.	No. Elevators.
Rossville ...	2	Near Salamon ...	2
St. Mary's ...	2	Ellsworth	3
Wamego... ...	1	Wilson	2
Kanopolis ...	2	Bunker Hill... ...	3
Salamon ...	2	Russell	2
Near Salamon ...	1	Ellis	3

Again, in Central Illinois, westward from Bloomington, on the Chicago and Alton Railway, I noticed elevators as follows:—

Town.	No. Elevators.	Town.	No. Elevators.
Hopedale... ...	2	Talula	2
Delavan	4	Ashland	3
San Jose	2	Prentice	2
Natrona	2	Sinclair	1
Mason City ...	6	Woodson	1
Greenview ...	2	Murrayville ...	2
A small siding ...	1	Manchester... ...	2
Peterburg ...	1		

On still another occasion I photographed nearly all the elevators between Big Stone City, S. Dakota, and St. Paul, Minn., along the Chicago, Milwaukee, St. Paul Railway, an average line as to elevators. The photographic tally was as follows, the total, including those not photographed, being about 100 elevators on about 150 miles of road:—

Town.	No. Elevators.	Town.	No. Elevators.
Coal	6	Bird Island ...	5
Appleton	5	Olivia	6
Watson	4	Stewart	4
Montevideo ...	6	Sumpter	2
Milan	2	Brownton	2
Granite Falls ...	3	Glencoe	4
———	5	Augusta	2
Rennville ...	6	Norwood	2
Hector	4	Cologne	2
Buffalo Lake ...	4	Minneapolis ...	30

The Minneapolis elevators, however, are all terminal. North of this railway the elevators are more numerous; south of it, less numerous. (See Plate I.)

It is upon data such as this that I have estimated the country elevators of the United States at between 15,000 and 20,000. These figures, which represent a conservative estimate, show the important part played by the country elevator, which would still exist and operate if the United States did not export a single bushel of grain. No account is taken here of the thousands of elevators connected with flour-mills in all parts of the country.

I have already given the location of the principal terminal elevators. Of special interest are those of Minneapolis, which furnish grain to the great flour-mills, and hence may be regarded as local elevators or home-consumption elevators. Minneapolis is a city of about 200,000 inhabitants. It possesses about thirty elevators, having a capacity of 27,500,000 bushels, capable of receiving upwards of 1,500 carloads of grain per day. These elevators could receive, grade, and deliver the annual wheat crop of New South Wales in five days. More than half of the capital invested in these elevators is Minneapolis capital.

Elevators have lately been erected on the Pacific Coast of the United States, and these are increasing in number. One of the latest (of which I insert a drawing, Fig. 7) is that erected by the Great Northern Railway, at

Seattle. Mr. D. Miller, second Vice-President of the Great Northern Railway, speaking for his road, in the absence of President Hill, said to me that it is intended to deliver in bulk from the Seattle elevator to ships, and the elevator is constructed for that purpose, as the picture shows. The Great Northern is putting on a line of steamers to carry in bulk, principally to Japan, China, and other parts of the East. Meanwhile the elevator is receiving in bulk, grading, and bagging, for which the elevator is specially adapted. The capacity of the elevator may be judged from the h.-p. of the engine, which is 125. These facts indicate a change on the Pacific Coast from the old system of bagging which has hitherto prevailed. The matter has often been agitated by Californian farmers, but until now the conservatism of the shipping interests has carried the day.

Bag System.

The sacks now used for grain in California, Oregon, and Washington are calculated to hold about 100 lb. of wheat. They are of lighter material than the New South Wales wheat bag. The price paid on the Pacific Coast in 1899 averaged 6 cents. They are universally sewn. The Pacific Coast size of bag is, in my opinion, more convenient to handle than the larger colonial size. I have watched the various loadings and unloadings incidental to the Californian wheat traffic, and consider that they are accomplished both more economically and more expeditiously than similar operations with the larger Australian bag. There is no special machinery for handling bagged wheat; it is all done with the aid of gangs of men. At the Stockton and San Francisco warehouses for wheat it is customary to shoot the bags of grain from the second story delivery, after the manner of many Sydney warehouses, by means of a slanting wooden shoot, which delivers, 5 feet from the ground, either on to wagons or on to ordinary hand-trucks, which latter receive five bags one above the other, and, under the guidance of unskilled labour, are wheeled aboard the boat or train. Taking into account the cost of bags, this method of handling grain is much more expensive than by means of elevators, except where only very small quantities are to be handled. That the Californians are successful exporters of wheat is not on account of the use of bags, but in spite of it. It is a handicap they have carried by virtue of their flat areas, peculiar climate, and wonderful harvesting machinery.

Apart from its economy in the handling of grain, the elevator has introduced accuracy into the grain trade. The element of uncertainty connected with such an irregular commodity as wheat bagged on the field is absent from elevator grain. It is a disadvantage to trade when the commodity concerned is irregular in quality, and the weight of the disadvantage generally rests on the seller. It is this fact, I am informed by a good authority, which has led to the construction of elevators in England, such as that recently erected on the Manchester Ship Canal, where wheat is unbagged as received from foreign parts other than the United States, and, after being graded in the elevator, is actually rebagged in order to be reshipped as required by the railway trucks in use in England, which for the most part do not carry in bulk.

The handling of grain at seaports, previous to despatch from producing countries and on receipt in consuming countries, has given rise to special machinery adapted to loading und unloading ocean-going vessels, such as portable elevator machinery, grain-barges, and elevator barges; all these are appurtenances of the grain wharves or grain-carrying ships, and are so many separate adaptations of the elevator principle.

An examination of the accompanying illustrations, which the writer has secured at some of the world's principal grain ports, will reveal the nature and great practical utility of these contrivances. They are, in a word, modifications of the elevator bucket and grain-belt, suitable to unloading and trans-shipping, and consist of small lightly constructed and therefore portable grain-elevators and grain-carriers.

As a specific case, let us take the unloading of the steamship "Friesland" at the wharf of the Red Star Line in Antwerp. She is laden with maize, and

Fig 16.—Placing a portable elevator on board a vessel which is to be unloaded; the elevator is shown at 7, half-a-dozen men are engaged, with the aid of the ship's tackle, in hoisting it aboard. The series of grain belts shown in Fig. 22 are also to be seen here at 1, 2, 3, 4, 5, 6.

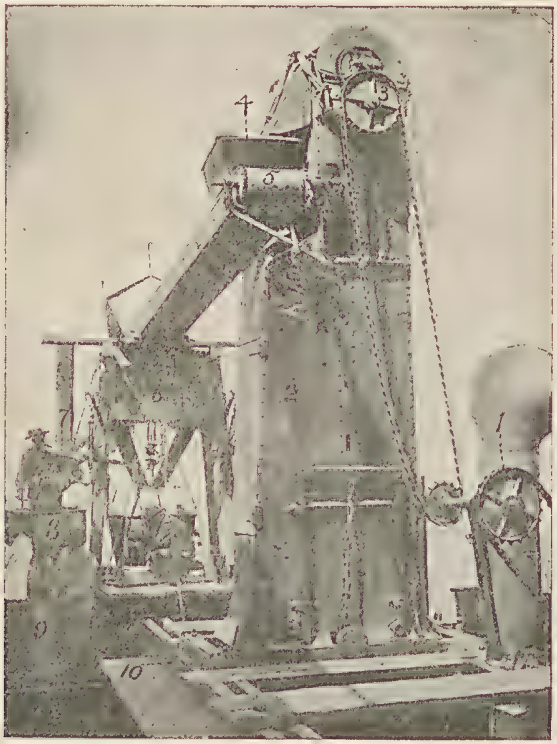


Fig 17.—Elevator at work removing the grain from a ship's hold. 1. Drive-wheel of elevator, driven by the ship's steam; 2, top of elevator, seen projecting from the ship's hatch, where it is clamped to the steel girders 10, laid across the hatch; 3, wheel immediately preceding the pulley at the top of the elevator; 4, hopper which receives the grain from the elevator buckets and delivers it on the grain belt 5, which in turn delivers the grain into the large wooden hopper 6; from 6 the grain is spouted into the weighing hopper 8, suspended from the steelyard 7; 8 delivers into bags, one of which (9) is shown being tied by two men.

has to discharge her present cargo into canal boats for various parts of Belgium, into bags for local consumption in Antwerp, and on to the wharf to await sale and transportation.

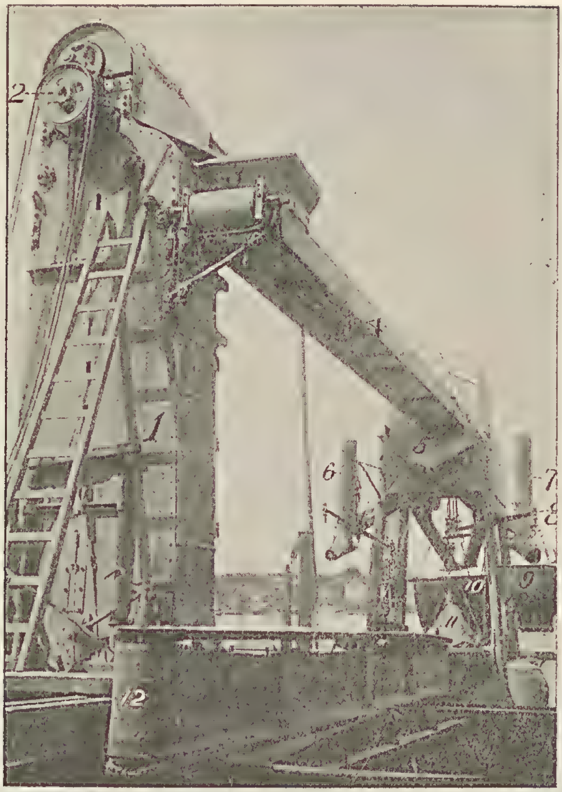


Fig. 18.—Apparatus for elevating and weighing the grain on board a ship. 1. Top of the elevator. 2. Drive wheel of the elevator worked from the ship's machinery. 3. Hopper receiving grain from top of the elevator. 4. Grain belt leading to the weighing-bin. 5, 6, 7. Spouts from the weighing-bin. 9. Sheet-iron weighing hopper suspended from one end of the steelyard 8. 10. Spouts leading over the ship's side to canal boats. 11. Weights (bagged up) on other end of steelyard 8. 12. A grain belt not in use, and standing on edge.

The elevator buckets, carried on endlass bands, are enclosed in tubes of sheet steel, $2\frac{1}{2}$ feet square and long enough to reach from the hatches of the ship to the bottom of the hold. These are sufficiently light to permit half-a-dozen men, with the aid of the ship's tackle, to place them in position in about half-an-hour. One of these portable elevators is seen in Fig. 16. The workmen are shown in the act of raising it from the wharf to the deck. The lower end of the elevator is still resting on a wharf trolley, while the other end is concealed by the ship's top-hamper. The appearance of the top of this portable elevator is well shown in Fig. 17; which shows the elevator fixed in position and at work.

Light steel girders are fastened across the hatch in pairs, and to these the elevator is clamped in an upright position. The power for working the elevator is supplied by the ship's steam winch, the driving chain being shown at the extreme lower right hand of Fig. 17. The details of the transmission of the power and the gearing are well shown in the illustrations. Two such elevators are usually placed on each hatch, and five pairs of elevators may often be seen working simultaneously on a single vessel's cargo. The vessel itself, constructed especially for a composite trade, including grain, has her hull divided by half-a-dozen permanent transverse steel partitions, and the

compartments thus created are, during loading, again divided longitudinally—*i.e.*, lengthwise the ship—by temporary partitions of 2-inch wooden plank. Toward the top of the grain-cargo the holds may be still further subdivided by tem-

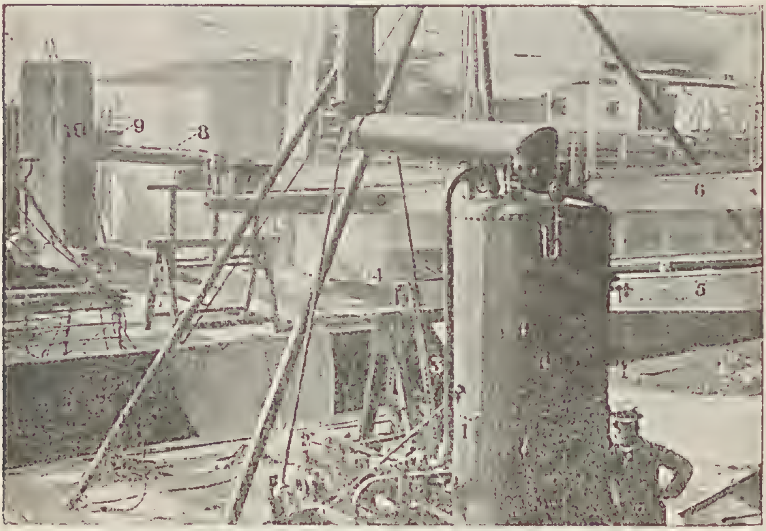


Fig. 19.—Dock scene, Antwerp: Unloading American maize from s.s. "Friesland." 1. Portable engine used to work the train of grain belts. 2. Driving chain of engine. 3 and 4. Driving chain of the grain belt 5. 5. Sheet-steel frame of a grain belt. 6. Another frame and belt which delivers on to 5. 7. The hopper of 6. 8. The belt which delivers on to 6 through 7. 9. The hopper of 8. 10. Top of the elevator which is working at one of the ship's hatches. The grain belt 8 is worked by the steam of the ship, but beginning with 6, all the other grain belts in the series are worked by the dock engine 1. See Figs. 16 and 22.

Fig. 20. Weighing out grain on the deck at Antwerp. 1. Grain belt coming from the ship's elevator. 2. Receiving bin into which the belt pours its grain. 3. Steelyard. 4. Weighing hopper which has just been emptied into the bag marked 5. 6. Bag which has just been lifted to a labourer's shoulders.

porary wooden partitions as an additional precaution against "shifting" during the voyage.

The grain buckets are about 10 inches deep, 6 inches wide at the top, and 1 foot or more long. They are worked at such a speed that when they turn

over the top pulley the grain is thrown into a spout which delivers on to a canvas grain-belt supported in a light steel frame, and driven by the same motor that drives the buckets.

Fig. 21.—Transferring grain from a steamship to a canal boat. 1. Engineer working the elevator. 2. Elevator. 3. Grain belt. 4. Hopper into which the belt delivers its grain. 5, 6. Steelyard and weighing hopper. 7, 8. Spouts leading from the weighing hoppers to the hold of the canal boat.

These canvas grain-carriers are well shown in the various illustrations, and it will be seen that they deliver the grain either into elevated wooden hoppers, from which the grain may be weighed out into bags, or into spouts which lead to canal boats which are to deliver the grain inland, or they may be joined end to end and deliver the grain in piles on to the wharf floor, as shown in illustrations 19 and 22.

Fig. 22.—Chain of light-weight canvas belt grain-carriers taking maize from a ship and landing it in huge piles on the wharf. 1. Top of elevator seen through dust and smoke. 2. Engine furnishing power to the series of grain-carriers. 3, 4, 5, 6, 7, 8, 9. The series of grain-carriers supported by tackle from tripods of tubular steel. 10, 11. Piles of maize.

In this latter case a portable engine is set up on the dock and utilised to run the necessary series of carriers. As shown in Fig. 19, the lower end of one of the carriers rests on wooden horses near the engine and receives the driving chain at that point. This carrier drives the next, and that in turn drives a third, and so on to the point of delivery. The various carriers are hung from tripods of tubular steel by means of rope and tackle.

The details of weighing and bagging are shown in Fig. 20. Cubical wooden hoppers, about 4 feet deep, receive the grain from the carriers. These wooden hoppers deliver on each side into square sheet-iron hoppers, each holding a bag of grain and hung on one end of a steelyard. As soon as the steelyard shows the correct weight, a slide in the bottom of the sheet-iron hopper enables the weigher to deliver the weighed grain into a bag attached below.

In delivering to a canal boat the large wooden hopper may or may not be used. The grain belts are competent to deliver at once into sheet-iron spouts which lead from the ship's rail down into the canal boats; these spouts are tubular and jointed every 10 feet or thereabouts, so as to be somewhat flexible, and they allow, by additions and disjointings, for the rise of the ship in unloading or any relative displacement of the ship and canal boat. All these details may be studied out in the illustrations.

The punts and canal boats used to carry grain in port, or on quiet waters, have a deck and a number of hatches, as pictured on Fig. 24, showing the unloading of grain punts at Liverpool.

In American ports the grain punts have become more highly specialised than elsewhere. There, small elevators may be seen, built on to the centre of

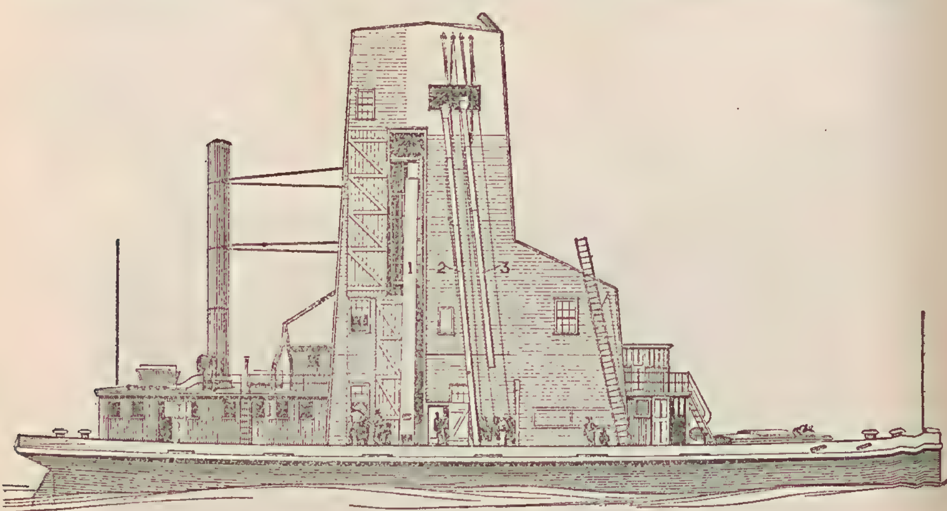


Fig 23.—A punt-elevator, that is, a grain punt on to the middle of which an elevating machine has been built. These boats are used in New York and other American ports. 1. The elevating belt. 2 and 3. The spouts which by means of tackle are lowered into the holds of large steamships. These spouts when in position take the grain from the top of the elevating belt 1. The interior of one of these punts is arranged so as to deliver all the contained grain to the foot of the elevator 1.

punts used for no other purpose than the transportation of grain. The interior of these punts is arranged to deliver the cargo to the foot of the central elevator, and the latter is tall enough so that tubes from its top may be lowered into the hatches of the largest ocean-going steamers.

These great vessels must be run with the utmost regularity, and must be detained in port as little as possible; accordingly the punt-elevators, as they may be termed, are built to cater to the necessities of these big steamers. All

the ship's officers have to do is to open the proper hatches—the punt elevator does the rest. Neither the deck nor the wharf of the ocean leviathan is cluttered up with grain and machinery as would otherwise be the case, and

Fig. 24.—Punt being unloaded at a European elevator located at the docks. The hatches of the punt are shown at 7, 8, 9, 10. 1. The side of the elevator building. 3. Tackle by means of which the arm 4 is raised and lowered. This arm is pivoted to the frame-work of the building. 5, 6. The elevator leg dipping into the hold through the hatch 8. The buckets are descending through 6, and rising loaded with grain through 5. The grain goes into the elevator through the spout 2.

furthermore her grain cargo is placed on board with a maximum of speed, no time being lost in erecting and adjusting temporary machinery. A punt-elevator is pictured on page 164.

European Elevators.

The elevator system has spread to Europe, and continues to find favour there, though the type of structure in use at many of the European ports differs from those already described. There are elevators of the purely American type, made of wood and put up by American contractors; of these an example may be seen at Manchester, England. At Liverpool, Antwerp, and other ports, however, an entirely different class of structure prevails. While the machinery is practically the same as that already described, the building in which it is housed is quite different, being of brick and nearly fireproof. The insurance on brick elevators is 3s. per £100, while that on wooden elevators is 25s. per £100; this great difference is considered by many European companies to more than justify the additional expense involved in a brick structure.

The brick elevator of the Grain Storage and Transportation Company, of Liverpool, contains some 200 hexagonal bins, or "silos," each holding about 200 tons of grain. The silos are about 15 feet in diameter, and 70 feet deep, and rest on arched brick tunnels. These tunnels are tapped on the sides and

top, the openings thus made forming outlets for the different silos. The grain belts run along these tunnels, one to each tunnel. The spouts are of English make, and are the same as those shown in Fig. 27. These spouts are kept locked, and the keys remain at the head office, being given out to assistants only when grain is to be delivered. The assistant receives his directions in the brief form, "Deliver 100 tons from No. 67." (See Figs. 25, 26, and 27).

Brick elevators, put up by incompetent engineers, have sometimes collapsed; no one but the thoroughly competent and experienced engineer should be allowed to plan or erect elevators of this kind.

Fig. 25.—Delivering machinery in a large English elevator. 1. Main grain belt arranged on a grade of one in ten. 2. Spout which takes delivery of grain from the belt, 1, and guides it to the silo, as shown in Fig. 26. 3 and 4. Other similar spouts.

The Société Anonyme des Magazins d'Anvers owns a large brick elevator at Antwerp, of an estimated capacity of 1,000,000 bushels. This elevator delivers bagged wheat for the most part, but is prepared to deliver in bulk. Grain cars of the American pattern stand ready to carry this latter.

Pneumatic Elevators.

Grain can be elevated by suction. If a tube through which air is being pumped is lowered over grain, so that the mouth of the tube, at which the air is entering, comes near the surface of the grain, this latter will be drawn up into the tube and carried along with the air; or, to state the same thing in a different way, if grain or similar material be forced into a tube along with air, by means of a fan, it will pass along the tube with the air, so long as the velocity of the air is maintained at a certain rate which is within the reach of ordinary machinery.

This fact has been utilised in a number of ways. Elevators have been constructed on this principle, as have also ensilage carriers. The system

possesses many advantages—in fact, all the advantages of other pneumatic carriers, such as speed and a high degree of adaptability to crooked routes. Unfortunately, however, this pneumatic system is so expensive as to preclude its adoption in commercial elevators. I saw no evidence, in either Europe or

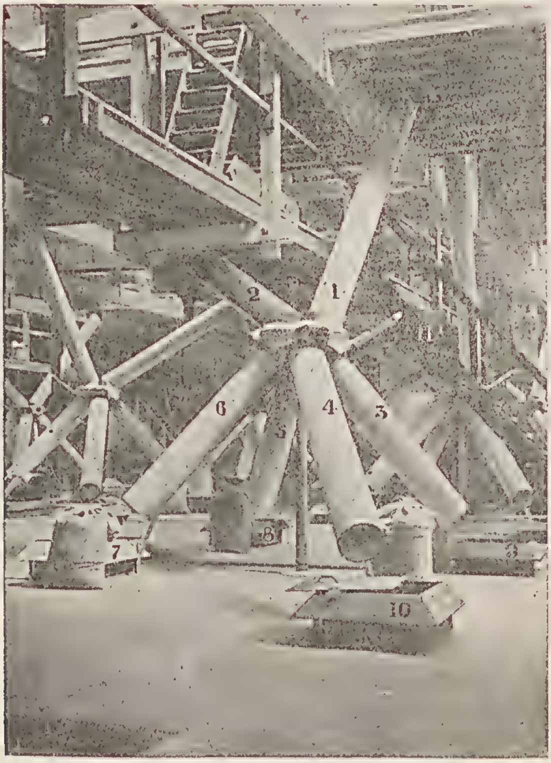


Fig. 26.—Delivery spouts at the top of silos in a large English elevator. 1 is the lower part of the spout 2, shown in Fig. 25. Fig. 2 of the present illustration is another similar spout. By pulling one of four slides, as 11, the grain from 1 or 2 may be delivered to any of the silos 7, 8, 9, 10, by aid of one of the spouts 3, 4, 5, 6. Of course, only the mouths of the silos are shown (7, 8, 9, 10, &c.), this floor being over the silos and some 80 feet above the ground.

America, that elevators of this class were gaining ground, and, until invention finds a way of lessening the cost of this attractive system of transportation, we may leave it entirely out of consideration so far as elevators are concerned.

Elevators in this State.

While elevators and storage in bulk have not been extensively tried in New South Wales, there are some elevator plants the history of which should be mentioned. Over ten years ago Mr. J. Crago, of Bathurst, built a wooden silo or bin of a cubical shape, 30 feet deep, holding, therefore, some 20,000 bushels. (Fig. 28.)

Some three years ago Mr. Crago put up a flour-mill in Sydney, and in connection therewith he constructed, about a year ago, an elevator of about 70,000 bushels' capacity, consisting of wooden silos or bins 8 feet across and 47 feet deep.

Both these ventures have proved successful, and Mr. Crago informed me that, in the latter case, he is sorry he did not make his elevator twice as large. No special difficulties due to climate have been encountered. The timber used in these two cases was ironbark and Oregon pine, and they have answered well.

About a year ago Messrs. Gillespie Bros. and Co. began the construction of a wooden elevator at the Anchor Roller Flour Mills in Sydney. This elevator has now been in operation for over six months, and is, in the words of

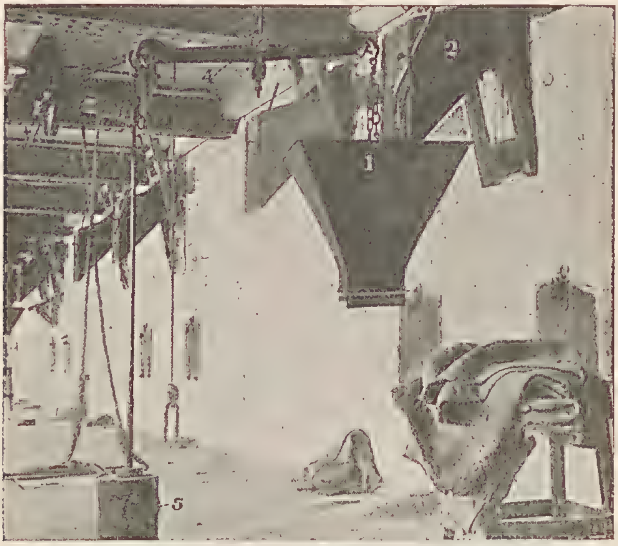


Fig. 27.—Bagging arrangements on the second floor of an English elevator. Shoots from this floor guide the bags of grain to the railway trucks. 1. Weighing hopper hung on a steelyard. 2. Mouth of a silo. 3. Lever for opening and closing the mouth of the silo. 4. Steelyard. 5. Weights.

the proprietor, "a great success." It consists of 35 bins or silos 8 feet across and 40 feet deep, the full capacity being about 70,000 bushels. The framework is of ironbark, and the silos of Oregon pine. The machinery requires 20-horse power, and handles 35 tons per hour. (Fig. 29.)

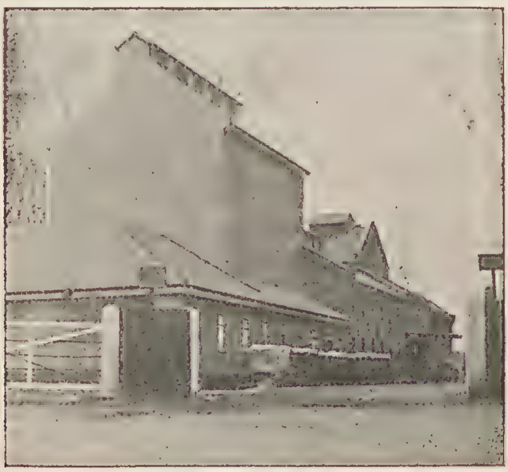


Fig. 28.—Elevator erected by Mr. F. Crago at Sydney (Newtown) in connection with his flour-mills. Capacity, 75,000 bushels.

All the above elevators are used in connection with flour-mills, and are, therefore, not of the strictly commercial type, having, as they do, special apparatus for mixing grain, and lacking for the most part the special weighing

machinery so necessary in the commercial handling of grain. They nevertheless show, on a small scale, all the essential features of the grain-elevator as used elsewhere, and, from an examination of them, we may conclude—

1. That the climate and wheat of Australia do not place any marked difficulties in the way of handling wheat in bulk.
2. That, in connection with flour-mills, the elevator is, in Australia, as everywhere else, a marked success.
3. That the insurance charged here on wooden elevators is not exorbitant.
4. That colonial timber is, to a certain extent, suitable for the construction of elevators.
5. That the cost of constructing elevators in New South Wales is not prohibitive.

To those conclusions I venture to add my own opinion, based on wide observation, that—

1. Experiment will prove that colonial timber is entirely suitable to the construction of wooden elevators.
2. That elevators will prove of benefit in handling grain that has been injured by mould, &c.

A careful consideration of these conclusions, based on elevators already constructed in New South Wales by the above progressive millers, will show to what an extent the supposed difficulties in connection with elevators in Australia have vanished. A little enterprise has caused them to disappear like mist before the rising sun. What reason is there to suppose that the further spread of this system of handling grain will not prove equally successful?

American Grain-cars in Europe.

No description of the American grain-car could be so graphic as the accompanying series of plates, for which I am indebted to Messrs. Dutilh-Smith, McMillan, and Co., of Philadelphia. These plates show the nature of the grain-cars in use on a variety of well-known American railways. (Figs. 10 to 16.)

This type of car has been introduced into Europe, and a considerable number are in use in Germany, Belgium, and England, where they are used among other things for the carriage of grain.

In England more and more of these cars are used year by year, but the conservation of the old-fashioned English miller hinders their use for the carriage of grain in bulk. The bag system suits these millers, who are accustomed to mix their grain in order to produce the flour they require. Such a miller can say, "Use so many bags of this sort of wheat, and so many of that sort," and he dreads any change that will disturb his old and reliable formula, and insists on ordering his wheat by the bag. On the other hand, the large modern English flour-mills are using large storage bins on the elevator principle, and they prefer to receive their grain in bulk. However, most of the wheat in England is still carried in bags, and the common practice of the receiving elevators is to deliver in bags.

Local Objections to the Elevator System.

The following objections to the elevator system have been raised:—

1. That we shall have to alter our methods of harvesting, and our harvesting machinery.
2. That we have not sufficient grain.
3. That our distance from market is too great.
4. That we have no suitable ships.

Fig. 29.—Elevator erected by Gillespie Brothers and Co. in connection with their Flour-mills at Sydney. Capacity, 75,000 Bushels.

5. That company monopolies in grain freight will be encouraged.
6. That the grain would heat, rot, mould, shrink, and get weevily, and be attacked by rats, mice, and moths.
7. That no restrictions have been placed in the way of the large buyer putting up elevators, and yet he has not put them up; hence they cannot be a good thing.
8. Elevators encourage wheat corners.

All objections that are raised to the expenditure of a large sum of money in the construction of elevators in Australia should be carefully considered. The subject is too important to be treated in a hasty manner. Let us, therefore, discuss each of the above, and determine what weight should be attached to it:—

1. *Alterations in our methods of harvesting.*—Much of our grain is harvested with the reaper and binder, and is afterwards threshed and bagged. No difficulty should be experienced by farmers who work in this manner. Unless they choose, they need make no material change. They may reap, thresh, and bag as usual, and deliver to the elevator, where they can unbag as easily as they could unload in any other manner and *receive back their bags.*

If they wish, however, they may allow the threshing machine to deliver into a grain-box on a dray or wagon, instead of into bags as at present. This is an alteration in method only so far as cartage is concerned. It is an alteration calling for no great outlay. Indeed, the cost of bags for two or three seasons under the present system would more than pay for the boxes which would have to be substituted. Should the farmer prefer to buy a special wagon for his grain, such as is described elsewhere, it is necessary to remember that these wagons are general purpose wagons, and the expense need not be all charged up against the carriage of grain in bulk.

It is interesting and sometimes laughable to consider our readiness to raise objections to proposed changes. The man who would draw a load of sand to the station without ever thinking of bagging it immediately raises objections to doing the same thing with grain—largely, it may be suspected, because neither he nor his forefathers ever handled grain in this manner. Handling in bulk, or in boxes as we may say, is really a simpler matter than handling in bags. There are no bags to buy, and there is no bagging to do. There is, however, a box to provide, and the threshing machine or cleaning machine to so set as to deliver into the box so placed on the wagon or dray. If we set these two things the one over against the other, it seems to me that the balance is in favour of the box, both as to expense and convenience. In any case, no farmer is obliged to make the change against his will simply because elevators are adopted; he can still go on in the old way and simply unbag at the elevator, get his bags back, and be so much in. And this is not unfrequently done by small farmers in the north-western part of the United States, as I have repeatedly observed.

Much the same may be said of the large number of farmers who use the stripper. They need make no change unless they prefer. If they do make a change, it is a minor change in the cleaner.

Where headers are used the changes required are the same as where reapers and binders are used.

The few combined harvesters in use would naturally go on as usual, and the wheat would have to be unbagged, unless the owner could contrive a bulking arrangement as an attachment to his harvesting machine.

In any of these cases no farmer could avoid the benefit that would come to the wheat industry, because of the accuracy and speed that would be introduced into the wheat trade.

2. *Insufficiency of our Grain Crop.*—It must be borne in mind that elevators handle all kinds of grain, and that we must not consider wheat alone.

Elevators have been introduced into the State of Texas, and have been successful there. I know of no nearer parallel to the case of New South Wales. The climates, populations, and social conditions of the two States are in many ways similar. The Texas wheat crop, in 1899, was 9,000,000 bushels. To this must be added several million bushels which would come in from Oklahama. Texas, and that part of Oklahama served by the Texan country elevators and the Galveston terminal elevators, make up an area about equal to that of New South Wales, as will be seen by the following table:—

—	Area in Square Miles.	Population.	Wheat Crop.
		1890.	1899.
New South Wales	310,000	1,130,009	13,500,000
Texas	265,000	2,235,523	9,000,500

From the above table it will be seen that the areas, population, and wheat crops in the two States furnish a fair basis of comparison. Unfortunately, however, the Texas railways cannot fairly be compared with those in Australia in considering the elevator question, because the railways of Texas are now, and were at the time of the introduction there of the elevator system, connected with the other railways of the United States, and in consequence cars from other parts of the country could be run into Texas to meet the growth and emergencies of the elevators. When we consider the fact that much of the expense of inaugurating the elevator system in New South Wales must go toward paying for suitable rolling-stock, we see how careful we must be in drawing conclusions from the above comparison.

Notwithstanding this drawback, the comparison is worth making, and teaches that, if the necessary rolling-stock is provided, the elevator system can be profitably applied to an annual product of nine to fifteen million bushels on an area equal to, and populated like, that of New South Wales.

What is the minimum quantity of wheat that can be profitably handled by an elevator? This question is one that must be answered according to surrounding circumstances. The manager of a large Liverpool storage and elevator company told me that, no matter what was ultimately to be done with even so small a quantity as a single cargo of bagged wheat received in Liverpool, the best thing to do first is to bulk it. Wheat from Australia, for instance, is unbagged at the ship's rail and shot into punts, and elevated, weighed, examined, and graded, no matter if it is to be sold again in bags the next day, as sometimes occurs.

A flood of light is thrown on this subject by the results of private enterprise in New South Wales. As pointed out in another part of this article, several small elevators have already been constructed in this State by enterprising millers, and in each case the owner pronounces his elevator a marked success. If these elevators of some 75,000 bushels' capacity are a success in connection with flour-mills, what stands in the way of their successful introduction to a larger sphere? If it is economical to handle the grain in bulk in the comparatively small quantity used by a single flour-mill, how much more so should it be to handle in the same manner all the grain produced in the State.

I do not forget that the handling of wheat in a flour-mill differs from that for purely commercial purposes. Making full allowance for this fact, there is such a close resemblance as, in view of the success of these small Sydney elevators, to nullify the objection so frequently raised by those who consider that our wheat crop or wheat export is too small to justify the use of elevators.

3. *Our distance from the market is too great.*—That depends upon what market is meant. If England alone is referred to, this objection certainly may have force, but it cannot be denied that the carriage of grain in bulk across the equator, and on voyages of forty days or more, is a matter in which we have

too little experience to enable us to assume that it can be successfully done without any extra precautions. This is a question that a few trial shipments would settle at once and for ever at a comparatively small cost.*

England, however, is not the only market. The requirement of the colonial market is at present larger than the exportable surplus, and elevators are just as useful in handling the locally consumed grain as in dealing with the export surplus. There is a widespread notion that the elevator is a machine for exporting grain, and is practically useful for no other purpose. This is far from being the case. In the United States, for instance, the country elevators would continue to exist and thrive if that country did not export a single bushel of grain, and, as has been said, the country elevators are the main feature of its elevator system.

It does not do to forget that China and Japan are importers of wheat. To meet the demands of these markets elevators have been erected on the Pacific Coast of the United States, and grain is already being shipped from there to Asia in considerable quantities. Preparations are being made to carry this wheat in bulk—if, indeed, this is not already accomplished. We are nearer the Asiatic market than the United States, and should be able to compete with them for this trade. This wheat export trade to Asia is certainly one in which the distance objection would not hold.

4. *That we have no ships suitable for carrying in bulk.*—This objection rest on misinformation. Suitable ships are available. They may not be in port at the present moment in sufficient numbers, but with moderate notice they could easily be mustered. There are companies trading regularly to Australia which carry grain in bulk on the Atlantic, and in their case it would only be necessary to divert suitable vessels to Australia. There are many "tramp" steamers engaged in carrying grain on the Atlantic with no binding contract as to a particular route or trade. These would certainly put in an appearance as soon as it became known that we have a grain trade belonging to their class.

5. *Company monopolies in freight would be encouraged.*—If the foregoing objection with regard to ships does not hold good, this present objection falls to the ground. Moreover, supposing there was but one company that carried in bulk from a given port, the producers would not be wholly at the mercy of that company, because the present carrying vessels constitute a competing factor. The elevators can deliver in bags as well as in bulk, and can bag more cheaply than can the producer. Hence the company carrying in bulk would be compelled to carry at a rate competing with present charges.

Even if bulk-carrying vessels were not at hand at the required moment any other available craft could therefore be utilised at the expense of bagging.

6. *That the grain would heat, rot, mould, shrink, and get weevily, and be attacked by rats, mice, and moths.*—Grain in bags is equally subject to these evils. Grain in bulk is less liable to attacks of weevils, moths, rats, and mice than grain in bags, and accordingly suffers less. The ventilation furnished in stacks of bagged wheat may in some cases be beneficial as regards heating, moulding, and so on, but in other cases it is harmful. It is certainly easier to check these diseases in bulked wheat than in bagged wheat. In an elevator the bins can be emptied and the grain dried at a minimum of cost. Mr. Crago, of Bathurst, has used wooden silos for storage of grain for upwards of ten years, and has had no special difficulty from any of these sources.

The fact that our grain is usually harvested in a drier state than in most other countries is in favour of its freedom from mouldiness when stored in elevators.

* The experiment of shipping grain in bulk by the White Star s.s. "Persic" has conclusively demonstrated the feasibility of bulk carriage from Australia to Europe. When that vessel delivered her wheat cargo at Liverpool, it turned out in splendid condition. It was landed on the quay by elevator, and, notwithstanding the unfortunate condition of the market at the time, the price realised for the bulk shipment was 27s. per quarter, which was considered highly satisfactory. The shipment was a complete success.—Ed. *Q.A.J.*

7. *No restrictions have been placed in the way of large buyers fitting up elevators, and yet they have not done so; hence elevators cannot be a good thing.*—Another misconception. There have been no suitable railway facilities for the interior transportation of grain in bulk, and this is an almost fatal restriction. Elevators in the grain districts are white elephants unless supplemented by the proper railway trucks. These two things must go hand in hand, and private enterprise cannot be expected to embark in the elevator business so long as our railways lack the particular kind of trucks necessary to serve the elevators.

8. *Wheat corners.*—It has been said that elevators encourage the cornering of wheat—*i.e.*, the buying up by speculators of large quantities of wheat when prices are low with a view to forcing up the price by creating a shortage in the amount of wheat available in the market. This has often been done in the United States, and it is certain that the American elevators facilitate such operations. As soon as the new crop comes into the elevators, its quantity becomes known and more or less subject to manipulation by speculators. The "buying-up" of grain is much facilitated by its accumulation in large quantities in elevators.

Thus far it seems as if this objection is a valid one; nevertheless, a little further consideration shows that State ownership introduces a factor that may completely alter the case. For, if the State owns and controls the elevators, it is in a position to enforce wholesome regulations against the improper manipulation of the wheat market. Granting that "cornering" is an evil, it would be hard to devise a better way to remedy that evil than to place the grain in charge of the State in a free country like Australia. Under proper regulations, no one could corner the market without the knowledge of the State, which would have power to interfere if the people chose to give it that power.

I am informed that the elevators erected some years ago in the Argentine are only now coming to be appreciated. The reason for this is twofold. Firstly, labour is very cheap in that country, and wherever labour is very low-priced the introduction of any kind of labour-saving machinery is more difficult than in a country like Australia, where labour is high-priced. Secondly, the necessary railway facilities for carriage in bulk were not provided.

Introduction of Elevators into Australia.

Listening to a conversation recently, I heard a shrewd observer hold forth somewhat as follows:—"You may rely upon it the millers and merchants of Australia will oppose the introduction of elevators by the Government. Why? Well, I'll tell you. At present the millers and merchants know more about the grain than anybody else, and they benefit by it. In any deal the man who knows the most can get the benefit of any uncertainty, and of course in a grain deal the greatest element of uncertainty at present is the quality of the grain, and this uncertain element often yields the merchants and millers a nice profit because of their superior knowledge of the grain market. Now this proposal to place practically all the grain in charge of the State with the power to grade it and treat buyer and seller alike will put the producers on a level with the buyers so far as a knowledge of the quality of the grain is concerned, and will to that extent benefit the producers at the expense of the present buyers. When the farmer can deliver to the State elevator and immediately receive an expert and impartial return as to the quantity and quality of his grain, he will be in a better position on the market than he is now, and of course those who now profit by his ignorance stand to lose just so much."

This opinion must stand for what it is worth. Personally, I think any opposition based on such grounds would soon collapse.

With regard to the introduction of elevators into Australia, there is hardly room for two opinions. My own opinion, expressed some years ago in the *Agricultural Gazette*, I find to be now stronger than ever. My observations

during the last eighteen months show that the elevator system has gained greatly during the last ten years. Not only are wheat, corn, and all kinds of grain now almost universally handled by this method, but even such unpromising materials as broken ore, coal, and road metal. All these are now elevated, graded, and delivered in a manner similar to grain. Coal is almost universally elevated, and stored at a height so as to be "on tap," so to speak, for railway engines, delivery teams, and ships. Coal is usually elevated by ordinary traction in cars specially designed to unload instantaneously. To illustrate this phase of the elevator system, I have inserted a picture of the coal elevator at Tacoma, in the State of Washington. I have seen hundreds of similar elevators in the various parts of the United States; in fact, they are now one of the commonplaces of the coal trade. I have collected material for a report on the superior mechanical methods used in constructing State roads in the United States. Among them is an elevator for mechanically producing, grading, and delivering road metal. Ore at mines is also raised, stored, and delivered in a similar way. The coal elevators have set the grain men to thinking, and now grain engineers are considering the feasibility of raising cars of grain to such an altitude as to unload by gravity at the top of the grain elevator.

Question of Ownership of the Elevators—State or Private.

The building of elevators by the Government is not the only possible way of introducing them into this country. It is of course certain that the box-cars must be provided by the Government as represented by the Railway Commissioners. But it would be possible to encourage private enterprise to put up elevators by placing a lower freight charge on grain in bulk.

We may suppose, for instance, the railways to offer to carry grain in bulk at a certain lower rate, provided it is delivered in certain quantity, and the cars loaded in a certain manner, and at a certain rate of speed, these provisos being such as to give the railways a reasonable chance to make a profit, and the rate such as to induce private enterprise to put up elevators.

State ownership of the elevators puts the State permanently in charge of the bulk of the grain food of the country. By certain persons such a proposition may be regarded with fear.

Most of the proposals hitherto made concerning the erection of elevators in this country seem to assume that the proper place to make a beginning is at the point of export. To begin in New South Wales by putting up a single large elevator at Sydney would, in my opinion, be but a poor object lesson. The benefit to be derived from the adoption of the system can only be secured by providing, simultaneously, elevators in the producing districts and at the important points of consumption and export, and at the same time providing railway facilities for transportation in bulk. If we do not do all this, and content ourselves with building a single elevator in Sydney, we shall repeat the mistake made in the Argentine Republic. Would it not be better to wait a little than to make such a false start?

We shall not have long to wait. Australians educate themselves quickly, and they will not be long in seeing the advantages which the elevator system offers in a country where labour is as well paid as it is with us. The problem confronting the Railway Commissioners is one of economics, and not one of the superiority of the elevator over the present system, and the Commissioners will not be long in finding a solution. Private enterprise has done much toward solving the question, and may be relied upon to continue to do so. If those who understand the benefits to be derived from the adoption of the elevator system only do their duty, and keep the question agitated, the discussion can end in only one way, and that speedily.

Before many years we shall be wondering how we ever managed to get along without elevators.

The steps to be taken in introducing the grain elevator system into a country like New South Wales are, it seems to me, as follows, and in the following order:—

1. Introduction of railway facilities for the carriage of grain in bulk. This first step must be taken by those who own and control the railways.
2. Building of country elevators. Of these 100 to 200, of 20,000 to 40,000 bushels' capacity, would be required to meet the present needs of New South Wales.
3. Building of large terminal elevators at the centres of consumption and export. Probably one or two of about 1,000,000 bushels' capacity would meet present requirements in New South Wales.

Of these three steps the second is by far the most important. It is a lack of appreciation of the logical order of the above steps, and an ignorance of the importance of the country elevators, that has hampered the progress of the elevator system outside the United States, whence it is destined to spread to all grain-producing countries where labour is expensive.

It is not easy to recommend a trial of the elevator system on a small scale. A single elevator will not bring a decided gain, nor be an adequate object lesson; but elevators might be introduced on one railway line, and the beginning thus made ought to furnish a basis for further action.

I have not given the matter that careful attention it will doubtless receive at the hands of railway and building experts; but, looking at it in my way, I should estimate the cost of inaugurating wheat elevators in New South Wales at not less than £400,000.

Finally, I will add that careful inquiry and reflection have convinced me that the introduction of grain elevators into Australia should be under some American auspices. No doubt American contractors would at first secure Australian contracts, as they have those of other countries; and such an arrangement would, in my opinion, be the best possible arrangement. By this I mean no disparagement to Australian engineers, who, on account of their better knowledge of local conditions, would no doubt soon, in the matter of constructing elevators, easily distance all competitors.

Agriculture.

FIRST STEPS IN AGRICULTURE.

10th Lesson.

THIRD STAGE.

By A. J. B.

Now that you are fairly started on your farm, the fencing and stockyards completed, and your first crops in the ground, you must think of getting a few head of DAIRY STOCK, PIGS, AND FOWLS.

Let us see how you are to set about the first very important matter. Unless you start properly, you will be sorry afterwards for your mistakes. Many farmers keep cows, but the cows do not keep them, for the simple reason that they are of a bad breed; but, notwithstanding all the object lessons they have before them, they still cling to the idea that anything with horns and a hide in the way of cattle is a bull or a cow, and they would rather give £1 10s. for a beast which eats voraciously and yields two quarts of milk a day than pay £10 or £12 for a really first-class well-bred Ayrshire, Jersey, or Shorthorn which will yield from 3 to 4 gallons per day. I suppose such farmers would never be made to believe that at an exhibition—the Great Pan-American Exhibition at Buffalo—there was a winning Jersey cow, Olga IV., which for one day gave 65¼ lb. of milk, for seven days 447 lb. 2 oz., in thirty-one days she gave 1,941 lb. 14 oz., and in 113 days a total of 6,359 lb. Previous to her last calf her return was 12,000 lb. of milk in eleven months, or something like £100 in value for the eleven months, supposing the milk to have been sold retail. How much is such a cow worth? Certainly worth half-a-dozen poor ones.

The question you will naturally ask first is: What breed is the best to start with?

This is hard to answer. There are several good breeds, but dairy farmers all have their particular fancy, and nothing will induce them to look with a favourable eye upon any but the particular breed which has given them satisfaction.

The breeds most used in Queensland are Ayrshires, Jerseys, Durhams, Devons, Holsteins and their crosses, and South Coast (Illawarra) cattle. We will consider the merits of each of these by and by. Meanwhile I want to say a word about a cow which is the dream of many a farmer. She is called the "general purpose cow"—that is, a cow which will be a good butcher's beast and yet equally as good a milker as the Ayrshire or Jersey. Many believe that such a cow exists. Others declare that it is a visionary idea, and that such an animal will never be found by the man who wants a large calf for the butcher every year, 20 lb. of butter a week, and 800 lb. of good fat beef when the cow is twelve years old. I once owned a magnificent cow—a Shorthorn. She was said to be a general purpose cow. Her general purpose was to give as little milk as possible, never to produce a calf after her first, but to provide something like 700 lb. of good beef when I put her to the only purpose she was fit for—a beef-producer. Now, think of what a general purpose cow will cost you. You must keep up the animal's condition as long as it lives, and to do this large quantities of food must be provided during its whole life—food which does not increase the milk-yield nor enrich it, and has small effect on the development of the calf, which you may or may not get every year. If you reckon up what you have spent in twelve years for food, you will find that you have expended over and over again the money you get from the butcher for the beef. So my advice is—do not go in for the general purpose cow, but select such as will bring you in regular supplies of milk, cream, butter, or cheese. The nearest approach to this imaginary animal is the Durham or Shorthorn.

The most economical cow for butter-making is undoubtedly the Jersey. But remember that is only some people's idea. Others may, and no doubt will, tell you differently.

What you want is a cow which will give you the most and the best butter at the least cost, and there is no breed which answers to these requirements so well as the Channel Island cattle.

In all breeds there are some poor specimens just the same as in a noble family, with a long record of brave and healthy ancestors, some weaklings are often found with none of the characteristics of their ancestors in them. Good grades are better than poor thoroughbreds. A herd of good, well-cared-for grade Jerseys should yield an average of at least 300 lb. of butter every year. And this is mainly profit, for you have the skim milk and butter milk and the yearly calf as a set-off against the expense of her keep.

Now, take Ayrshires. I am not going to give you the history of the origin of the various breeds. That will not help you to be a good dairy farmer. What you want to know is—First, what breed to start with; second, how to make the start; third, how to treat and feed your herd, so as to get the greatest amount of milk, butter, and calves from them. That is quite sufficient for you to learn.

The Ayrshire breed is well known all over the world. There is a great variety of colours in Ayrshires, even in the best herds, but the colours never blend together as in the Durhams. All the red and black spots are quite distinct from the white.

They are not specially built for beef-production, but they easily fatten, and give a very remarkable amount of fine beef in spite of the smallness of the carcass. They are regular and constant milk-producers. A herd of twelve, well-managed, will yield 5,000 lb. of milk each annually. In the United States there is a herd averaging 14 cows, which has regularly produced an average of 6,407 lb. of milk to the cow. Last year (1901) 19 of the same cows gave 6,956 lb. of milk. Four of them gave over 10,000 lb. in a year, and 1 over 12,000 lb. The milk averaged $4\frac{1}{4}$ per cent. of butter fat, and the cows averaged 353 lb. of butter each. Single cows of this herd made butter records of 504, 546, 572, and 607 lb. within twelve months. These and other facts concerning Ayrshire cows are all recorded in the *Dairyman*, a paper published in Sydney.

At the Queensland Agricultural College, the grade Ayrshires have well kept up the reputation of the breed, single cows giving 552 and 642 lb. of milk in a month, and from 21 lb. to 28 lb. of commercial butter. The grade Jerseys at the same place have given up to 722 lb. of milk and 36·38 lb. of butter in the same time.

Now here you have before you the value of the Ayrshire and Jersey as dairy cows.

We will now consider the Devon breed. This race of cattle combines many good qualities. They have round, plump, low-built, and powerful frames. A Devon cow will yield good quantities of rich milk and butter, puts on flesh easily, and will thrive with less care than the more delicate Jersey, producing as much butter per pound's worth of feed as the latter. In America the Devons are bred as much for working bullocks as for dairying purposes. They furnish excellent workers, being tractable, gentle, tough, strong, and making good beef when liberated from the yoke. They are the hardiest of our farm stock, and do a fair share of duty in the dairy. They have the peculiarity of laying on flesh and fat from the inside in feeding, and, were it not for the test by the scales, would be supposed not to be doing justice to their feed. At the Queensland Agricultural College there are several Devons in the dairy herd, yielding between 400 and 500 lb. of milk per month. The milk is not rich in butter fat (3·8), and the butter yield is about 18 lb. per month.

The Holstein is receiving much attention just now. It is too large in the frame to be considered an ideal dairy cow, but crossed with the Ayrshire it produces a cow much valued for cheese production. For butter purposes it is not nearly so valuable as the Ayrshire or Jersey, as the low test is not

compensated for by the extra quantity of milk produced by the crossing. I remember that a few years ago Mr. Mahon, Principal of the Queensland Agricultural College, did not much favour the Holstein breed (and there is no better authority on dairying and dairy stock in Australia than he); but since the College Holsteins have become acclimatised I believe his views on this breed have been somewhat changed, and the Holsteins are well represented in the College herd.

Now for the South Coast cattle. These are of purely Australian origin, so far as the cross is concerned. They originated in a Shorthorn cross introduced many years ago—90, I think—by a Mr. David Berry. This cross was again crossed with the Ayrshire, but not very successfully. The strain now contains much of what is favourably known in England as the Yorkshire milking strain. A breed was wanted by the settlers of the south coast of New South Wales suitable for the rich, moist pastures of Illawarra, and they have devoted some ninety years to the work, the result being a breed, now famous all over Australasia, known simply as South Coast cattle. The champion dairy cow of Australia, owned by Mr. D. Hyam, was a South Coast cow, Blossom, a three-quarter-bred Jersey, the other fourth being Ayrshire. At a recent show of the Berry Agricultural Society she yielded no less than 27¼ lb. of butter in one week.

Ada, Topsy, and Fancy, at the Queensland Agricultural College, are of this breed, and the two latter milked 448 lb. and 586 lb. respectively with first calf from 1st to 30th April, 1902, the yield of commercial butter being 21·07 lb. and 23·62 lb.—butter fat percentage, 4·2 and 3·6.

I would strongly advise any of you who intend starting a dairy herd to first see Mr. Mahon or write to him. You cannot go wrong if you follow his advice, either in the selection of cattle, the method of dealing with milk and cream, the making of butter and cheese, and the rearing of calves.

There are several other breeds valuable in the dairy herd, such as the Guernsey, a relation of the Jersey, which yields a milk abnormally rich in butter fat; the Kerry, which adapts itself to different climates more easily than any other known breed; and others. The Kerry cow is a good milker, and the milk shows a good percentage of butter fat.

Having decided on the breed you propose to begin with, you must see about the purchase of a bull. Never mind about pure-bred cows. It is far better not to go to the expense of pure-breds, when you can easily get good grade kine. With the bull it is different Never use any but a pure-bred with an undeniable pedigree. Be sure that he comes from a good milking strain. It is useless to expect a badly bred bull or cow to produce good results in the way of building up a dairy herd. As I have told you, there is a great difference between the beef cow and the dairy cow, and this is a fact you must never lose sight of. You cannot, by any amount of feeding, raise the quality of milk produced; therefore, adhere to the dairyman's golden rule—Breed for quality, and feed for quantity. At the same time the necessity for judicious feeding cannot be too strongly impressed on your minds. Knowledge of breeding must be assisted by judgment in feeding. It is far better to keep a small number of cows and feed them well than to keep double the number and only half feed them, for profit can only be obtained when care is bestowed on the herd.

Do not depend on the natural pasture. You have seen how ruinous such foolish dependence has been to hundreds of dairy farmers. Grow plenty of rich succulent fodder in favourable seasons, and preserve as much as possible in the form of hay and silage. The good dairy farmer will never be without a good supply of silage. I told you in the last lesson that good silage will keep for a great length of time. As you never can be certain of the seasons, this fact should induce you to lay by large stores of this valuable fodder, so that you will not be obliged to sell or starve your cattle or send them away to other places when a drought occurs.

Now, I will give you a little advice on selecting cows. You may take it as a maxim that a good milk cow usually shows good exterior points, yet many animals showing bad external points are superior milkers. The true test of a dairy cow is her performance at the pail. The owner and manager of the largest dairying establishment in the world (Mr. Robertson, Canada), when he went to Ayr, his native county, to select new stock, found amongst the celebrated prize-takers so many inferior milkers that he made his selections from the herds actually in use in the dairies of Ayr and Dumfries. If a superior herd is to be built up, no test other than that of the pail must be relied on. The best milking cows, regardless of breed, should be selected, and in making such a selection keep the following cardinal points in view:—SIZE: Anywhere between 600 to 2,000 lb. live weight, other things being equal. CONFORMATION: Large barrel, as shown by deep middle and ribs well sprung. Neck, shoulders, and thigh thin, wide over hips and loins, thin in flesh, and lacking beef form when well fed; showing good health in having good heart and girth and smooth hair.

Mr. John Mahon says the true type of a dairy cow may be thus described: Fine hair, yellow oily skin, thin neck, thin sharp shoulders, flat thighs well apart to make room for the udder. Long hips, large chest capacity for lung expansion, and the most essential of all is a deep flank with well-shaped udder running along the belly and well up behind the thighs, free from any but fine hair, with milk veins visible and extending toward the arm-pit, the head long and broad between the eyes; large muzzle with a clear eye which indicates a strong constitution.

It is a mistake to cross pure-bred stock; they should be kept *distinct* and *pure.* The different breeds have been crossed, and dismal failures have resulted. A Jersey judiciously crossed with an ordinary cow will give far better results than if crossed with a pure-bred, especially if the pure blood comes from the sire's side. A cross with an Ayrshire sire from a good milking strain and the Shorthorn or ordinary cow will give good results. This cross is within the reach of every dairyman in this State.

Breed your own cows. It is not always easy to get good cows without breeding. If others can breed them, so can you; then, what need to go outside your own fence to find a good milker. An intelligent farmer, and especially professional breeders are not likely to sell their best cows and keep the worst; but, if you do happen to get a really good animal from either breeder, you will be made to pay such a price as will make you sit down and wonder why you never thought of breeding your own stock. Breed such animals as are best suited for the district in which they are to be kept. For high poor ridgy country, Mr. Mahon recommends a light animal, such as the Ayrshire or Devon, crossed with the best of the cows to be found in our present herds. For heavy black soil country he advises the Ayrshire and Shorthorn cross, which produces strong animals of sound constitution. If you want to make cheese a specialty, then adhere to the Ayrshire and Holstein. The Shorthorns are good milkers if bred for the purpose, and in this country have yielded an average of 400 gallons of rich milk and even as much as 1,000 gallons. Still the Ayrshires are considered preferable to the Shorthorns, and, if selected from a good milking strain, are difficult to surpass.

Questions on Lesson 10.

1. In commencing your dairy herd, what breed of cattle would you begin with? Why?
2. Name six of the best breeds of dairy cattle.
3. What is meant by a "general purpose cow"? What are the objections to such an animal?
4. What is the nearest approach to the general purpose cow?
5. Which breeds are considered the best for milk and butter production?

6. How much milk should a good dairy cow yield monthly? How much butter?
7. State what you know of Devon cattle?
8. What are South Coast cattle?
9. State what you know of the South Coast breed.
10. What points have to be observed in the purchase of a bull?
11. What part does feeding play in the quantity and quality of milk?
12. What is the true test of a good dairy cow?
13. Describe the characteristics of a good milker.
14. Would you cross pure-bred cattle? If not, why not?
15. Why should you breed your own cows?
16. What crosses would you use—(*a*) on poor ridgy land, (*b*) on heavy black soil flats?
17. Which breed or cross is considered the best for cheese production?

11th Lesson.

THIRD STAGE.

In the last lesson I gave you general directions how to start your dairy herd with a fairly certain prospect of success. In this one I shall deal with the subject of dairying generally, and first I will take CLEANLINESS. This is all important, and yet is too much neglected by farmers. If you cannot be a cleanly dairy farmer, then do not go in for the business. Don't be afraid of the work cleanliness entails. Clean the cows, the buckets, the hands, the clothing. Keep all the stalls perfectly clean and free from all smell. There is nothing like milk for picking up bad odours. I will just tell you what happened to some milk in a dairy I was visiting. I had a pannikin of milk given to me, and when I tasted it I found it strongly impregnated with some delicious scent. The manager of the factory could not account for it in any way, but just as I was leaving the room I noticed a white pocket handkerchief lying near the tub the milk was taken from. I took it up and smelt it, and found that it was heavily scented. It had lain there forgotten since the previous night, and the milk in the open tub had absorbed the odour. But of all germ distributors manure is the worst. It produces them in countless millions, and amongst them there are germs which produce internal parasites when taken into the human system and consequently are productive of many diseases. Try and protect all vessels containing milk, cream, butter, and cheese from flies. These insects crawl about over all sorts of foul and decayed matter which are full of disease-producing germs Then they transfer their attention to the milk, with the result that the filth is deposited in it. Now that will show you how absolutely necsssary it is to keep everything clean and sweet, and to have the milk-room well ventilated. Keep plenty of water going—hot and cold—and wash every utensil rigorously.

There are two kinds of microbes present in butter and cream—one kind is friendly and useful, the other a dire enemy. The latter thrives and multiplies on bad flavours; but let all be clean, and the friendly little fellows get to work and cause the correct ripening acidity in the cream, and that is the great essential to producing good butter.

Thebest way of cleaning milk cans is to dissolve 1 lb. of soda in 20 gallons of water, taking care that the solution boils. This kills microbes and prevents rust. Do not think that you have washed a milk can out when you have "sluiced" it with hot water. The hot water is harmful because it makes the albumen of the milk stick to the sides. Albumen means simply white of egg. Rinse out the cans with cold water, and then use the hot solution. Always pass the milk through a strainer into the cans.

Now about the treatment of the cows. Don't knock them about. The cow is of a very nervous temperament, and any roughness, any bustling them, or striking them at milking time results in a decreased flow of milk. Treat

them kindly, talk pleasantly to them, and they will readily respond to such treatment.

I think I had better give you some instructions in sheltering and feeding your cows before saying anything further about milking.

In the old country the utmost attention is paid to the comfort of both cows and steers, and this is absolutely necessary in Europe, where severe winters and heavy rains, snow, sleet, and cold cutting east winds occur.

The Australian farmer for many years took no care of his cows, winter or summer. Rarely was any shelter provided for them, and they lived or starved in open paddocks all the year round. Times have changed, however, and most farmers are now alive to the fact that we have seasons in Australia equally injurious to dairy cows as the European and American winters. I need only mention the frequency of cold westerly winds in winter, the often long-continued rains, accompanied by cold cutting winds, whilst the paddocks are a sodden mass of mud and water. How could the poor animals be expected to show well in the milking-yard after being exposed night after night to such weather. Even during the warm weather cattle like to stand or lie under the shade of the trees, yet thousands of well-bred cows spend the whole day in a treeless paddock without any shelter at all. This is the height of inhumanity. Shelter should always be provided for two reasons. One is, because it pays to keep the animals comfortable; the other is that it is humane to care for them. Unlike wild cattle, wild beasts, and birds, who are free to find sheltered spots well known to them, the domesticated cattle are simply poor helpless brutes depending on their owners for little comforts which are too often withheld.

There is no need to start by putting up expensive sawn timber sheds, for bush timber will answer the purpose perfectly well. A few rough posts, plates, and ties with saplings laid across, and these covered with green bushes, and these again overlaid with a foot or so of bush grass or old hay, will make a grateful shade for them in summer, and for the winter the sides might be protected by slabs. Here the cattle could also be fed. Another and more securely built shed with shingled or iron roof would be required for the milking-shed.

Now as to feeding and feeding for milk. Feeding must be done regularly, at regular hours. The fodder must be supplied with judgment. Some people carry a great bundle of lucerne or green corn to a stockyard holding perhaps a dozen cows. This is pitched down among the animals, whether the yard be inches deep in mud or inches deep in dust and manure. They struggle and fight for the food, much of which is trampled into the dirt, whilst the stronger beasts drive off the weaker, who thus do not get a fair share.

You cannot expect even a good animal to develop her full milking capacity from poor feeding. The proper way is to give food until the full milking capacity is attained, and this is done by gradually increasing the quantity until the cow has reached its highest standard. Always feed after milking, and give no more food than the animal can consume.

There are very many kinds of natural and artificial fodders which are milk-producing. You need not be told the chemical constituents of these. If you are curious on that point, there are plenty of books to be got which will interest you. Grow fodders which are the most suitable for the soil you farm, such as maize, oats, barley, rye, mangels, setaria, lucerne, &c. On these your stock, if well managed, will thrive. If you feed with silage, a cow will require from 40 to 45 lb. daily, 30 lb. of lucerne, 30 lb. oaten hay, or 70 lb. of green maize, barley, rye, or wheat That is a fair day's ration for a cow. A sufficient supply of salt should always be given to milch cows. Place the salt under cover from the weather, and where the cattle can get at it easily. Cows allowed to go without salt for four or five days will fall off from 2 to 3 per cent. in quantity of milk.

The next important thing for you to learn is: How to milk. The first principle in the art of milking is to *milk the udder perfectly dry*. This will cause a greater flow of blood to the udder, and it is from the blood that the development of more material for milk-forming is to be sought. I have already

warned you that kindness and gentleness must be exercised in the milking-shed. When the cow is quite calm and contented, wash the udder and teats with warm water, and dry them. What follows I will let Mr J. Petersen, of the Danish Agricultural College, at Odense, describe as he has done in a prize essay on dairying published in several journals in Australia.

He says:—The work is begun by catching hold of both the front teats with the whole hands. The hands are now in turn moved up against the udder with a gentle pressure, and they are then closed gently and softly (likewise in turn) about the teat, the close beginning at the top and extending downwards.

These gentle movements should be continued until one notices that the cow lets the milk "come."

The milk must now be emptied out in long unbroken jets by means of the same movements, but applied with more vigour. When the front teats give no more milk, treat the back teats in the same way.

The milk must be squeezed, not dragged, out of the teats. The teat should therefore be grasped with the whole hand, and the latter must not slide up and down the teat more than necessary. The sort of milking which is carried on by grasping the top of the teat with the thumb and first finger (the latter is the worse), and then pressing the fingers together and dragging down the teat, is very bad indeed. The cow does not like it, and it is harder work for the milker.

The milking is not over even when the back teats (or the last milked) give no more milk. *A vigorous second milking must now take place.* After one has again changed a few times from the first milked to the last milked teat and back again, the udder must be "worked" by means of gentle handling, and afterwards the last drop of milk must be squeezed out of the teats.

Here we could also learn from Nature. Look at the lamb when it sucks. See how it pushes its mother's udder when the teats give too little milk.

The little pig also can be seen poking its mother by means of its soft snout, so as to get all the milk possible.

One would almost think that they found the last milk sweeter than the first! So they no doubt do, as it has been proved by the number of investigations that it is by far the richest.

If the first ½-lb. of milk are mixed (equal amounts being taken from the four teats) from each of, say, forty cows, the 20 lb. of milk thus collected will, as a rule, not even produce ½-lb. of butter.

But if, in the same way, one were to collect the last ½-lb., which, after inadequate milking, can still be worked out of the udders of the same forty cows, nearly 2 lb. of butter can be got out of the 20 lb. of milk.

Any milker can roughly prove this for himself. Collect the first jet from a teat in a small glass, and the last jet (or the last drops) which can be squeezed out of the same teat in another glass. Place the two glasses in a cool place; and after twenty-four hours it is astonishing to see the great difference there is in the layer of cream. Getting out all the possible milk is therefore of importance, not only for the development of the cow's power of giving milk, but also for obtaining rich milk. Thus the milker who does not take sufficient time to milk the cow quite dry either does not know her or his work or is not carrying it out conscientiously.

After the milking is finished, the cow should again be patted in a soothing way, and a kind word may again be said to her.

The milker should always keep an eye on the state of health of the udder and teats. If swellings or lumps or tenderness in the udder, sores on the teats, or blocked milk channels are observed, or the milk looks unnatural (for example, lumpy, reddish, &c.), the owner or other responsible person should be at once informed.

As diseases of the udder and teats are often infectious, such cows should always be milked last, and the milk from the diseased udder should be carefully put in a separate pail and thoroughly disinfected (and then thrown away, of course), or thrown away where it cannot spread the infection.

The milk canal inside the teat is occasionally very narrow, or has a frequent tendency to get blocked. To make use of a straw or such means to clear it, is very wrong, as it can set up inflammation in the corresponding gland. A teat with a blocked milk canal should be rolled gently between the hands held out flat, and then carefully milked.

GOOD ADVICE (IN BRIEF).

1. The cow is a living creature.
   Use her kindly, and you get more milk from her.

2. Use develops the living instrument.
   (*a*) Milk dry! Milking dry develops the udder, and consequently the power of giving milk.
   (*b*) And one obtains richer milk, *since the very last is by far the richest.*

3. Milk in the right manner.
   (*a*) Grasp the teat with the whole hand.
   (*b*) Press the teat out.
   (*c*) Don't forget the gentle push up against the udder.

Remember—
   (*d*) Never stop or let the work be interrupted when the milk is coming.
   (*e*) Remember the second milking and the last drops.
   (*f*) Pat the cow when you have finished milking.

4. Cleanly milking.
   (*a*) Have clean pails (to milk into and for carrying the milk).
   (*b*) Wash your hands before and (in the shed) during milking.
   (*c*) It is best to milk with dry hands.
   (*d*) Milk in a suitable and clean smock.

5. The state of health of the udder.
   (*a*) Tenderness or hard lumps in the udder or on the teats.
   (*b*) Blocked milk channels, &c.
   (*c*) Unnatural-looking milk—should all be *at once* reported to the owner or other responsible person.

6. Milking times.
   (*a*) Begin at a fixed time.
   (*b*) Milk the cows in the same order.

To whoever has charge of the cows.
   1. Clean cows.
   2. Good air in the shed.
   3. Plenty of light.

If a cow is milked three times every twenty-four hours, the milk obtained is both more *abundant and rich* than if milking takes place only twice a day. But, whether one milks three times or only twice daily, the times between the milkings should always be as nearly as possible of the same length. The cow is a creature of *habit;* her udder works steadily and regularly. *Hence the milking time should be most carefully kept*, and the same pair of hands should milk the same cows in the same order. If milking is begun too late, the cow becomes restless, and, as regard those which give much milk, the tension in the udder can give pain—in all cases the milk is lost.

Altogether, it ought to be clearly realised that the cow repays all unpleasantness by giving less milk.

Questions on Lesson 11.

1. What is the most important matter to be attended to in dairying?
2. How should milk cans be cleaned?
3. Why should cows be treated gently? What is the result of rough treatment?
4. How would you provide shelter for dairy cattle? Why is shelter necessary?
5. What rules should be observed in feeding cows?
6. What quantities respectively are required as a daily ration for cows of—(*a*) silage, (*b*) lucerne, (*c*) oaten hay, (*d*) green maize, barley, rye, or wheat?
7. Why should all cows be allowed access to salt?
8. Describe the right and the wrong methods of milking.
9. Why should the last possible drop of milk be taken from the cow? What difference in butter-yield is there between the first and the last milk? How can this be proved?
10. How should a blocked teat be treated?

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE. JUNE, 1902.

Farm.—Notwithstanding the dry weather, a great deal of work has been carried out on the farm, 25 horses having been kept constantly employed during the month: 29 acres of Algerian oats were planted—14 in the 40-acre plot, and 15 in the sheep paddock; 40 lb. of seed per acre was planted with drill; 5 acres were planted with rye in plot 3, at the rate of 1 bushel per acre; 4 acres of Allora Spring wheat were planted in the garden paddock, and 5 acres in plot 7; 10 acres of Cape barley were planted in plot 10 (5 acres) and 40-acre paddock; 24¼ acres were planted with lucerne in plots 11 and 12. As there was not sufficient moisture in the soil to cause the seeds to germinate, the method of planting without pickling the seed is the safest one to adopt, as the seed in its dry state is not likely to take any harm in the ground, and, should rain fall, there will be no hindrance to its rapid growth. Seven tons of pumpkins were harvested. It is needless to state that the yield was poor, being a little over 1 ton per acre; 1 acre of Cape barley, a plot of lucerne, and the garden were regularly irrigated, and all are showing good results. A method of "sub-drainage" is now being carried out; the system adopted will be fully explained in the next report. A good deal of clearing work, including hauling, cross-cutting, and burning logs, was carried out; 20 loads of manure were placed on plot 3, prior to planting with rye. The cow pea, which did well through the dry weather, was converted into ensilage. The water supply in the Lockyer Creek holds out well; at the present time 109,000 gallons per hour flow past the College. I have brought the matter of irrigation before the notice of some of the farmers on the creek. All of them realise the importance of a scheme, but the cost of carrying it out places the work beyond their reach. The total rainfall for the month was ·03.

Garden.—A great deal of irrigation and scuffling have been done. Aphis has been very troublesome, and has been treated with tobacco-water. Cabbages, carrots, and beetroot have been planted. Successional sowings have been made of lettuce, leeks, cauliflowers, cabbages, tomatoes, &c., for transplanting later on. The garden is in first-class order. A splendid lot of vegetables are now being disposed of locally—viz., at Laidley, Forest Hill, Gatton. and Helidon.

Dairy.—During the period under review, 805 gallons of milk gave a return of 352 lb. of butter, and 150 gallons yielded 159 lb. of cheese. Forty-five cows were milked daily. The milkers were fed night and morning on wheaten straw chaff, which had been steamed, and to which molasses had been added, the daily average being 7 lb. of molasses per cow. The increase for the month included—Ayrshire, 1 male; Jerseys, 1 male; crossbreds, 5 males and 3

females. We disposed of 2 Ayrshire and 2 Shorthorn bulls. Sixty-nine head of crossbred cattle were trucked to Woombye on agistment.

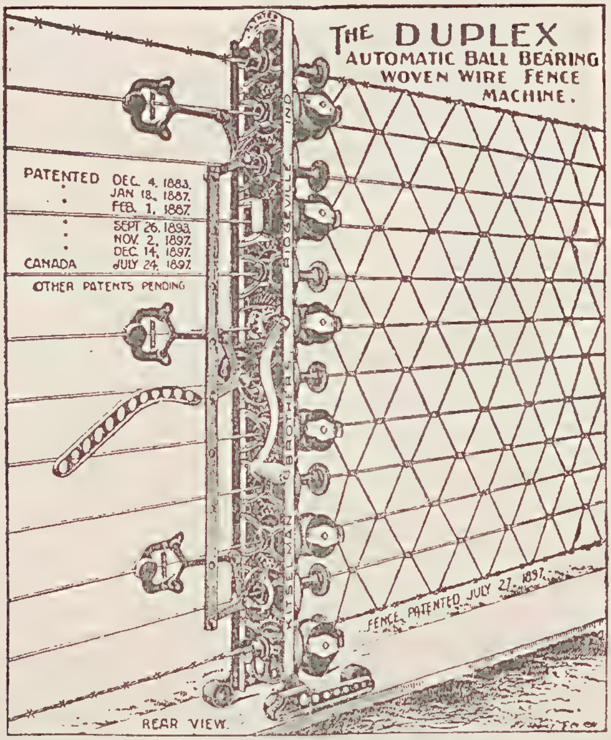
Piggery.—The increase of pigs for the month was as follows:—Berkshires, 9 boars, 9 sows; Middle Yorks, 8 boars, 6 sows; Tamworths, 4 boars, 5 sows; crossbreds, 4 boars, 3 sows. The sales during the month comprised—Berkshires, 7 boars, 5 sows; Middle Yorks, 3 boars, 2 sows. These were sold for stud purposes. Eight mixed pigs were killed for curing.

Poultry.—The students have of late taken a good deal of interest in this department, the expert in charge having devoted much time to imparting knowledge relating to the various breeds and the method of breeding and feeding for market purposes. We have a very nice lot of young birds coming on; for these a good demand exists. Records are now being kept of the laying qualities of the different breeds.

THE DUPLEX WOVEN-WIRE FENCE.

Amongst other machinery shown in action at the Exhibition at Bowen Park was a woven-wire fencemaking machine.

We occasionally are asked how many wires will make a pig-proof or general stock-proof fence. Judging by the way in which we have seen pigs struggle through a close barbed-wire fence, and by the way the cattle along the railway lines not only get their heads but occasionally their whole bodies



through the solidly built close-wired fences along the lines, we are inclined to think that wire fences, as usually constructed, are not proof against either pigs or small cattle, whilst the barbed wire is a source of great injury to larger and more valuable stock.

Mr. J. M. Mitchell has now introduced machinery for wire fence manufacture which cannot fail to commend itself to farmers and graziers as well as

to market gardeners in the neighbourhood of the large towns where wandering cattle and horses often break through and steal. Take a fence of, say, ten No. 12 wires and two barbs, stretched tight and fixed to posts 8 feet apart. One would think that such a fence would suffice to keep out everything but an elephant. So long as the wires remain tightly stretched, it will answer the purpose. But single wires have an unfortunate knack of loosening. Then gaps appear; and knowing old cows and horses are not slow to become aware of the fact, and they promptly get through. Now, if all these wires were bound together by diagonal wires until a net-like mesh is created, then we have a combination of wires set up in such a fashion as to give a maximum of strength, effectiveness, and durability such as exists in no other every-day fence. By means of the machine advertised in this issue, two men will weave and fix to the posts 40 rods (220 yards) of such fence per day. The posts may be 11 yards apart, but, if an exceptionally strong fence is required, then the posts may be 16 feet apart.

Mr. Mitchell has a fence of this kind with the posts 105 feet apart, and on one occasion a horse threw himself against it, and the rebound flung him on to his feet again, the fence being none the worse for the experience. So well are the wires bound together that one of the stretched wires may be cut, and it will only spring apart about a quarter of an inch. Ten or twelve wires would have to be cut to let a calf through. Such a fence costs less than any other, and is more secure and durable. The best galvanised wire for the purpose costs from 1s. 6d. to 1s. 7d. per rod. Those who saw the machine at work at the Exhibition are loud in their praise of the work it performed.

The probable cost of erecting one chain of such a fence as that shown in the illustration would be, at most, 9s. 6d. Straining posts of 12-inch hardwood sapped, five chains apart, 1s.; two split intermediate posts fixed, 1s.; 44-lb. wire, f.o.b. Brisbane, 6s.; six upright stays of No. 6 wire woven in the fabric, 3d.; two men weaving and fixing eight chains per day at 5s. each, 1s. 3d. A selector on the Gowrie Estate says that he can do the work at 1s. per chain less, building a strong, endurable, and effective fence which will turn all domestic animals.

DR. MAXWELL IN THE NORTH.

The greatest and most important advances in the world of science have only been made by slow degrees, in the face of much opposition and frequently of downright hostility. We need only refer to the introduction of labour-saving machinery in the cotton-spinning, weaving, agricultural, and other industries to show how unreasoning ignorance battled, but battled vainly, against such innovations. Dr. Maxwell has come to us to advance the sugar-growers' interests. His experience here is not singular from that above quoted. He has to overcome old prejudices, as he had to overcome them in Hawaii, and as he did triumphantly overcome them in those islands by the wonderful success of his operations. The *Ingham Planter's* leader on this subject, which we reproduce, is well worthy of careful perusal:—

For many months prior to the recent visit of Dr. Maxwell to the Herbert and Johnstone River districts there was some grumbling amongst cane-growers at what they seemed to regard as neglect of that attention which they claimed as a right from the gentleman in question. Now that he has visited and addressed the Ingham, Halifax, Geraldton, and other farmers, it remains to be seen whether his advice will be put into practice. If it is not, there will be very good grounds for the conclusion that those who felt themselves injured by Dr. Maxwell's frequent absences in Melbourne and elsewhere had no real desire to be instructed by him on important points in connection with cane cultivation, but simply exercised the Britisher's privilege to grumble for its own sake, and not from any belief that they were in any way suffering by non-visitation from the Director of Sugar Experiment Stations. Should the

growers of the North not benefit by Dr. Maxwell's advice to them, it will be their own fault, and they will accentuate the seriousness of a situation caused by indifference to scientific instruction. Not long ago a writer in a metropolitan contemporary called attention to the fact that in the sense of a general adoption of the doctor's advice, the growers were not, in any way, to be complimented, although a few of them might have striven to apply the treatment prescribed for the land. He still continues to prescribe, to use the words of the writer in question, with all the eloquence and force at his command, but it never seems to advance the grower any nearer the idea of action. For example, he has repeatedly advised the proper part of the cane to use as plants, to cease burning trash and return it to the soil, to plough deeper by subsoiling, and to limit the area cultivated guided by labour facilities, and a host of other minor but very important details. And it is these details, trivial as they appear, that go to build up remunerative crops. Now, how many of all his numerous hearers are really acting on that advice? The most important of all the items mentioned, and which the doctor so strongly condemns, is that of burning trash. It is said that the Colonial Sugar Refinery Company have never burned a blade of trash for five years on any of their estates. But what can be thought of those outside the interests of that company who contemptuously ignore not only eminent advice, but actual visible facts, where every blade or leaf is saved? It would really seem that there was more difficulty in getting the advice or cure administered than to abandon the trouble that gave rise to the disease, or, what is the same thing, stunted crops. In spite of the deplorable condition of the cane, apart from drought, there seems a blind determination to keep in the old ruts, and at the same time a rooted belief that the methods which have brought about comparative ruin cannot be improved upon. And if those interested cannot be persuaded to consistently follow the advice of such an eminent exponent as Dr. Maxwell, what possible hope is there of resuscitating the industry? Prejudice usually dies hard, but the prejudice in the sugar industry of the State, with one notable exception, is unparalleled. The writer, it may be presumed, was writing mainly of Southern canegrowers and their crops, but it is not improbable that many Northern growers may be classed in the category of those who prefer to follow their own notions as to cultivation rather than the advice of the scientific expert. The reports of Dr. Maxwell's addresses, as published in the Ingham and Geraldton papers, should be filed by our canegrowers for future reference; and we cannot do better than advise them to very carefully "read, mark, learn, and inwardly digest" these reports, as the advice and instruction they contain are, beyond question, of a very timely and valuable character.

AGRICULTURE IN THE FAR NORTH—AN EXPLANATION.

Exception having been taken to some remarks we made in our article of June last on "Agriculture in the Far North," by Mr. P. Petersen, sugar-planter, of Hambledon, Cairns, he has requested us to publish his version of the conversation which took place between him and Mr. Boyd. What we wrote was as follows:—

I was introduced to a farmer named Petersen, close to Hambledon. He was a successful cane-grower and a believer in white labour, so I asked him how the loss of the kanaka would affect cane-growers. His reply was ambiguous in the extreme. He is the father of nine fine sons. The eldest of these boys help him to do all the work in connection with his sugar crop. Why should he employ black labour? The young men, I suggested, earned white men's wages. Well, there was the rub. He could not afford to pay his sons the wages they could earn in other capacities or as regular farm or mill hands. It was not fair to the boys, but what could he do? "Employ black labour while you can get it," was my natural suggestion. But this would be against his principles as a believer in the Labour Party. The natural inference was that rather than employ black labour, and being unable to pay proper wages to his

sons, he would throw up the farm, only he did not say so, and I did not press my inquiries further. It is wonderful what men will do for the sake of a principle. He has a beautiful farm, a comfortable home, rich land, and a good crop, and yet —— but I eschew politics.

Mr. Petersen brought the matter before a meeting of the Cairns District United Farmers' Association, and he was deputed to write as follows to the Department of Agriculture :—

"I may state that the principal reason why the association took the matter up was because Mr. Boyd somewhat departed from the strict facts of the case in his article, and misrepresented my statements to him; therefore to justify the association in its action I am requested to put the true facts of the case before you.

"When asked by Mr. Boyd how I thought the sugar industry would fare under the Federal Government, I said it would be the salvation of the small farmers, for the following reasons :—In the past, farmers with families entered into competition with farmers who had an unlimited supply of cheap labour; consequently they had to pay their families at kanaka rates or else let them go off the farm to find other employment. Under the system inaugurated by the Federal laws, a farmer can give his own family a decent wage and create *bonâ fide* settlement by teaching his own family the best mode of cultivating the soil, and thus keeping up the supply of agriculturists who are at present mostly imported, and when they become extinct there would be none to follow in their footsteps, as the bulk of farm hands would be undesirable aliens if we continued under the old system. That is what I put before Mr. Boyd as my reasons, which, you will see, is rather different from what he writes. I may add that Mr. Boyd also errs in saying I told him I had nine sons to work my farm. As a matter of fact, at the time of his visit the four eldest were otherwise employed, two were attending school, one had just left school, but was too young to do a man's work, leaving me with two instead of nine, as averred. That is practically my ideas as put before Mr. Boyd, and for what reason he distorted them is best known to himself and those who favour the retention of the kanaka. I most strongly object to be misrepresented by Mr. Boyd or anyone else, and hope you will use your influence to put the true facts before the readers of the *Journal*, as I consider I am entitled to defend myself and the cause I support against all misrepresentation.

"I am, yours respectfully,

"Hambledon, 21-7-02." "Peter Petersen.

OLD STUMPS.

To remove old stumps, a correspondent of the *Country Gentleman* gives the following :—"Get a 2-inch iron pipe, 8 feet long; have a steel point welded into one end of it. With a sledge hammer drive this under the stump as far as may be necessary. Drop half-a-stick of dynamite into the hole thus made, and tramp earth upon it until the hole is filled; then light the fuse. The stump will be lifted entirely out of the ground with no earth adhering to it, so that it may be burned the next day."

Another correspondent, writing in regard to removing old stumps, recommends :—"In the autumn bore an inch hole down into the centre of the stump 14 inches or 16 inches deep. Put a couple of ounces of saltpetre into this hole, fill with water, and plug up tight. In the spring take out the plug, pour into the hole about ½-gill of kerosene oil and light it. The stump will burn away slowly, without blazing, to the ends of the roots, leaving nothing but ashes."

Dairying.

BLACKLEG IN CATTLE.

A correspondent of the *Agricultural Gazette of New South Wales* gives garlic as a cure for blackleg. The dewlap of the calf is opened wide enough to admit a "pod" of garlic, and a single stitch is made to keep it in. Mr. J. D. Stewart, M.R.C.V.S., veterinary surgeon to the Stock Branch, says that inoculation with garlic as a preventive against blackleg is practised with varied success. Personally he has no great faith in it, preferring to rely on vaccination with attenuated micro-organism of the disease, which induces a mild non-fatal attack of blackleg that confers immunity against the disease being acquired naturally.

MILK TESTS AT ROCKHAMPTON AGRICULTURAL SOCIETY'S SHOW.

18TH JUNE, 1902.

	Name of Owner.	Name of Cow.	Weight of Milk.	Percentage of Butter Fat.	Lb. Commercial Butter.
			Lb.		
Morning.	Mr. F. J. Lennon ...	Cherry	16	2·0	·358
	Messrs. Archer Bros. ...	Rosebud	11¾	3·8	·500
	Ditto	Violet	14¼	3·7	·590
	Ditto	Miss Hoyle ...	22½	4·4	1·108
	Ditto	Ladybird	13½	3·9	·589
	Ditto	Spot	14	3·4	·533
	Ditto	Queenie	12½	4·0	·560
	Mr. J. Grace	Beauty	24	2·0	·537
Evening.	Mr. F. J. Lennon ...	Cherry	14½	4·2	·670
	Messrs. Archer Bros. ...	Rosebud	7¼	4·8	·389
	Ditto	Violet	10¼	4·8	·551
	Ditto	Miss Hoyle ...	15¾	5·6	·987
	Ditto	Ladybird	11¼	4·0	·504
	Ditto	Spot	10¾	3·8	·457
	Ditto	Queenie	5¾	6·2	·399
	Mr. J. Grace	Beauty	21¾	4·0	·974

TOTAL YIELD OF BUTTER.

	Lb.
Cherry	1·028
Rosebud	·889
Violet	1·141
Miss Hoyle	2·095
Ladybird	1·093
Spot	·990
Queenie	·959
Beauty	1·511

POINTS GAINED IN ORDER OF MERIT.

—	Points for Time in Milk.	Points for Weight of Milk.	Points for Weight of Butter Fat.	Points Deducted when less than 3 per cent.	Total Points.
Miss Hoyle	2	38	41	0	81
Beauty	0	45	30	10	65
Violet	7	24	22	0	53
Ladybird	5	24	21	0	50
Spot	3	24	20	0	47
Queenie	6	18	19	0	43
Rosebud	7	19	16	0	42
Cherry	0	30	20	10	40

The above was unavoidably held over owing to pressure of matter connected with the Agricultural Conference at Toowoomba.—Ed. *Q.A.J.*

MILKING COMPETITION AT THE ROYAL AGRICULTURAL SOCIETY OF QUEENSLAND SHOW.

6th and 7th August, 1902.

Owner.	Name of Cow.	Weight of Milk.	Percentage of Butter Fat.	Weight of Commercial Butter.
		Lb.		Lb.
Mr. Brosnan	Dolly	$16\frac{1}{2}$	2·4	·39
Thompson ...	Berry	16	4·4	·78
Paterson ...	Trixy*	$18\frac{1}{2}$	3·2	·66
Webb	Emily	$12\frac{3}{4}$	3·1	·44
Carrig	June	$15\frac{1}{2}$	3·1	·53
Mr. Brosnan	Dolly	14	3·9	·61
Thompson ...	Berry	11	6·0	·73
Paterson	Trixy	$12\frac{3}{4}$	4·0	·57
Webb	Emily	10	3·9	·43
Carrig	June	$12\frac{3}{4}$	3·9	·55
Mr. Brosnan	Dolly	$17\frac{3}{4}$	2·6	·51
Thompson ...	Berry	15	3·8	·63
Paterson	Trixy	18	3·8	·76
Webb	Emily	$12\frac{1}{2}$	3·4	·48
Carrig	June	14	3·0	·47
Mr. Brosnan	Dolly	†	...	...
Thompson ...	Berry	$12\frac{1}{4}$	4·8	·65
Paterson	Trixy	$12\frac{1}{4}$	3·4	·46
Webb	Emily	$9\frac{3}{4}$	3·5	·38
Carrig	June	13	3·8	·55

* Mr. Paterson's cow Trixy won the prize awarded for the greatest quantity of milk—viz., $61\frac{1}{2}$ lb.

† Mr. Brosnan's cow Dolly upset her milk at the final milking, thereby losing her chance of winning the prize awarded to Trixy.

In Order of Merit.

	Berry.	Trixy.	Dolly.	June.	Emily.
First Day	1·51	1·23	1·00	1·08	·87
Second Day	1·28	1·22	·51	1·02	·86
	2·79	2·45	1·51	2·10	1·73

SOAP-MAKING.

Soft Soap.—Take 100 lb. of fat and 20 lb. of caustic potash with from 8 to 10 gallons of water. When saponification is complete, boil down till a paste is obtained.

It is not possible to make, on a small scale, a soap nearly equal to that made in large factories, but with care a moderately good soap that is not too alkaline may be produced by the cold process. Soaps made on a small scale do not lather sufficiently, owing to their being incompletely saponified. Generally, kitchen fat is employed, and, as this is nearly all tallow, it yields a very hard soap that will not lather well. To obtain a good soap, use cocoanut oil, which saponifies easily. Cotton-seed oil or olive oil with a little tallow may be used. One hundred parts of fat require sixteen parts of caustic soda (70 per cent. strength). This would be rather more than 3 lb. of fat to 8 oz. of caustic.

One hundred and fifty-two pounds of fat, consisting of tallow, cotton-seed oil, and palm oil, should be heated in a boiling pan, and soda lye added to it gradually while it is thoroughly stirred. The amount of caustic soda required is $21\frac{1}{2}$ lb. dissolved in from 20 to 25 gallons of water. After thoroughly boiling, which will require several hours, and when saponification is complete, common salt is thrown into the pan.

This causes the separation of the soap to the surface, while the lye and impurities go to the bottom to be run off after several hours' settlement by a cock at the bottom of the pan. The soap is then again boiled until it is perfectly homogeneous.

The Orchard.

FRUITGROWING IN THE BOWEN DISTRICT.

By ALBERT H. BENSON.

Although a short article on the above subject appeared in the February number of this *Journal*, the editor, who has recently received a number of photographs of the fruitgrowing industry as at present carried out in the Bowen district, has asked me for a further contribution on the subject.

In my previous paper I stated that successful fruit culture in this district is mainly dependent on the intelligent and systematic use of water for irrigation purposes, as there is an abundant supply of suitable water, and the soil is one that responds readily to its judicious application. Since writing my previous article I have paid a visit to Bowen, and have inspected all the orchards shown in the accompanying illustrations.* The result of this inspection has shown me conclusively that growers must look to irrigation as the first source of water supply for the trees' requirements, and that such irrigation should be carried out regularly rather than trusting to the uncertainty of the rainfall. The winter, spring, and early summer are always more or less dry, and extra moisture, that must be artificially applied, is required during this time of the year in order to set the fruit, and thus secure a crop; and this, followed by the summer rains of normal seasons, will usually be found sufficient to produce satisfactory returns. Growers have been too apt to trust to the rainfall, and, instead of starting irrigating when the trees needed it, have, in many instances, put off doing so in the hope that rain would come; and, finally, when they have started irrigating, the trees have already suffered to a considerable extent through lack of moisture.

I am thoroughly satisfied as to the suitability of the district for the production of citrus fruits of the best quality, as the soil is well adapted for this growth, and, with the abundant supply of suitable water that is available for irrigation purposes, I am confident that if the same is intelligently applied, and its application is combined with thorough cultivation, the industry is capable of considerable extension with profit to the individual growers and to the district generally.

As to the quality of the fruit grown by means of irrigation, the specimens submitted by the Bowen delegates to the recent Conference at Toowoomba would have been hard to beat both for size, appearance, and flavour, and the bulk of the fruit seen by me during my recent visit was of very good quality, taking into consideration the extremely unfavourable season. In addition to fruit culture, the growing of all kinds of vegetables is being systematically carried out by means of white labour in the Bowen district. The quality of the vegetables grown is very good, and there is a good supply for local requirements. At the time of my visit potatoes, peas, beans, tomatoes, cabbages, cauliflowers, turnips, squashes, pumpkins, onions, leeks, &c., were in plentiful supply.

The garden of Mr. Maltby, on the north side of the Lower Don, is a good example of the quality and quantity of vegetables of all kinds that are capable of being produced in the district when energy and intelligence are devoted to their culture. The soil is by no means the best in the district, but by hard work, thorough cultivation, manuring, and latterly, by irrigation, by means of a windmill, the results both as regards quality and quantity are very satisfactory, and prove the oft-repeated and very commonly neglected fact that a small area, thoroughly looked after, and with the concentration of one's energies to such an area, is found much more profitable than trying to handle a larger area of ground than can be profitably made use of, or, in the words of our American cousins, trying to chew off more than you can swallow.

* We are indebted for our illustrations to Mr. F. Kenna, M.L.A., member for Bowen.—Ed. *Q.A.J.*

Plate XI.

1. Unloading and Storing Fruit at the Cyanide Chamber, Don River, Bowen.
2. Irrigation Plant on Mr. Kyle's Orchard.
Avenue of Orange-trees on Mr. Potts' Orchard.

Plate XII.

3. Avenue of Emperor Orange-trees on Mr. Kyle's Orchard Don River, Bowen.
5. Gathering Fruit on Mr. Jensen's Orchard.

THE ORANGE ORCHARDS OF THE DON RIVER, BOWEN.

Unloading and Storing Fruit, Cyaniding Chamber, Bowen.

The first illustration (Fig. 1) shows fruit being unloaded and stored at the Bowen Cyaniding Chamber. This is the third season in which the chamber has been in use. Having been built by the P. A. and M. Association, it is under their control. The charge for fumigating is ½d. per case to members of the association, and 1d. per case to non-members. The contract price for the erection of the room was £52; its storing capacity is between 600 and 700 cases. The dimensions of the chamber are 13 feet long, 10 feet broad, and 8 feet high. The wharfinger attends to the cyaniding, and is remunerated by the P. A. and M. Association to the extent of 1s. for every 100 cases fumigated.

Irrigation Plant at Willowbank Orchard (the Property of Mr. J. Kyle).

Fig. 2 shows the irrigation plant in the foreground. This consists of a 4-horse power boiler attached to a No. 3 pulsometer pump—capacity, 3,500 gallons per hour. The water is forced a distance of from 20 to 30 feet, when it enters the main pipe, and is distributed throughout the orchard by means of galvanised iron pipes. There are two wells on the estate, and the boiler, being mounted on wheels, can be shifted from one to the other for convenience. There has been no scarcity of water up to the present, despite the fact that there has been no rain to speak of for over twelve months.

Avenue of Emperor Mandarin Trees at Mr. Kyle's Orange Orchard, Willowbank.

Fig. 3 depicts an avenue of Emperor Mandarin orange-trees at Mr. J. Kyle's orchard, on the Don. This orchard consists almost entirely of this species of orange, the owner having satisfied himself some years ago that the Emperor is the best-paying variety. The soil in which they are growing is a loose, sandy loam, and can be easily worked at any time in the year. The fruit produced at this orchard is well known for its excellent quality, and a small parcel exhibited at the Agricultural Conference at Toowoomba won the admiration of all.

Avenue of Orange-trees at Burnfoot Orchard (Mr. Potts').

Fig. 4 shows an avenue of orange-trees in the well-known Burnfoot orchard which covers an area of from 10 to 15 acres of rich, loamy soil. The fruit grown here is of a very superior quality—thin-skinned and exceptionally juicy. There are from 500 to 600 trees in this orchard of various types. An irrigation plant, consisting of a 4-horse power vertical boiler and No. 4 pulsometer pump, keep the trees well supplied with the necessary moisture. The output of fruit in a favourable season exceeds 3,000 cases.

The ladybirds thrive here, and these insects were so numerous this season that they practically cleared the orchard of scale.

Gathering Fruit at Mr. S. Jensen's Orchard.

Fig. 5 illustrates a portion of Mr. S. Jensen's orchard, on the Don, with the fruit-gatherers at work. The variety of orange principally grown here is the Scarlet Mandarin, some of the trees being of enormous size, averaging thirty cases of fruit per tree. The soil here is a light loam of great depth. A couple of windmills supply the power for irrigation purposes.

The proprietor is very painstaking in the marketing of his fruit as to condition, &c., and consequently secures top price. The quality of the fruit is "A1 at Lloyd's."

Mr. Jensen secured highest prices this year at Melbourne for his mandarins—a fact which speaks for itself.

THE JACK (*ARTOCARPUS INTEGRIFOLIA*).

[By the Manager, State Nursery, Kamerunga, Cairns.]

The Jackfruit (*Artocarpus integrifolia*, Linn.) is of the same family and the nearest known relative of the famous Breadfruit (*A. incisa*). The name *Artocarpus* is derived from two Greek words literally translated, viz., *Artos*, bread; and *Carpos*, fruit, and its second name is purely botanical, *integrifolia* meaning entire leaved to distinguish it from *A. incisa*, the cut or incised leaved Breadfruit.

The Jack fruit, being of a much darker green, and having very much smaller leaves, and often being quite a different shape and size, the similarity of the two trees will often not be commonly apparent.

There are several allied species, as *A. Lakoochia*, *A. Chaplasha*, *A. hirsuta*, about which very little would seem to be known, and which do not appear to have an economic value proportionate to the two species mentioned. The Jack is a native of East India and the South Seas, inhabiting countries with a hot and moist climate, and is essentially a tropical tree. It will not generally thrive in a locality subject to strong winds, as it is somewhat brittle, and will not stand severe frost, though much hardier in this respect than the Breadfruit.

It is an umbrageous or thick foliaged tree and an evergreen. One tree exists in this Nursery which is thriving particularly well, having readily adapted itself to the climatic conditions obtaining here. An illustration accompanies this article. The tree shown is about ten years old, and 35 to 40 feet in height; it has been in bearing four years or so. During the last season it bore a heavy crop of fifty or sixty fruit, averaging in weight from 5 to 10 or 12 lb.

I have observed a few trees here and there in North Queensland, mostly in old gardens, where presumably it was grown more as a curiosity than for use; in any case very little advantage would seem to be taken of its useful properties. Several varieties of the tree exist, and some were probably introduced into Queensland at one time, though I have not yet met with more than one variety, which is by no means the best. The better varieties are known as the "Honey Jack" in India and Java, from the sweet syrup that is to be found within the pulp round the seed, and the "Root-bearing Jack," which produces its fruit entirely or partially underground. This latter is a specially fine fruit, and much valued in the Orient. Some writers seem to be of opinion that old trees of the ordinary or "Honey Jack" variety will bear fruit upon their roots in this way, but this is not authenticated. The root-cropping tree is generally considered a separate variety, and though I have seen, sown, and cultivated thousands of these trees, have never yet seen an ordinary Jack that will do this from mere age. This root-bearing may, however, be brought about by artificial treatment occasionally, which methods I will describe later.

Another variety of the species is the "Wild Jack," which is a much larger tree than the cultivated or sweet one. The fruit is smaller, and though sweet, not so pleasant; the tree itself, however, is more spreading, contains more timber, and as a fodder tree is the more useful of the two.

The fruit of the Jack tree is oval or oblong, is muricated on the rind, and of a bright green colour, turning slightly darker or duller when approaching ripeness, but never becoming quite yellow. When opened it is white inside; the inner pulp or edible parts are separately attached to the centre core, and surrounded by or packed in viscid fibres. Each piece of pulp is about the size of an egg plum, pale yellow in colour, and contains one seed.

The tree, like the cocoa, bears its fruit upon the stem and thicker branches. The fruit has a somewhat strong scent, which is intensified if allowed to become over-ripe. This smell is disliked by some, but on becoming accustomed to it, or on tasting the fruit, it ceases to be offensive or even noticeable.

The tree is very prolific, and the fruit often attains tremendous size and weight—fruit of 80 lb. have occasionally been met with. In Southern India I have obtained fifty to seventy fruit from one tree, and myself cut a specimen weighing 70 lb.

Plate XIII.

Jackfruit-tree, Kamerunga State Nursery, Cairns.

In Queensland, however, I have not met with any large specimens—the average would seem to be from 5 to 10 lb., although one fruit of 23 lb. is on record.

The tree comes into bearing here in three to four years, and while large fruit will contain as many as 200 seeds, ten to twelve seeds per fruit is more common. The cropping season is also very short in this State, usually lasting less than two months between January and March.

The fruit is distinctly palatable and is wholesome and nutritious. The smell, however, is apt to prejudice one against it on tasting it for the first time, and if, in ignorance, an over-ripe fruit is opened, not only is the smell intensified and rendered disagreeable, but the fruit is not so nice flavoured, for, like the Durien, to which it is sometimes likened, it must be taken at the right degree of ripeness to be appreciated.

If these over-ripe fruit are removed or buried, the smell is really no stronger than that of the mango, and not as disagreeable. To judge a ripe Jackfruit, however, needs a little practice, for one cannot judge by colour. The usual method is to tap the fruit or flip it with the finger, when the hollowness of the sound denotes the degree of ripeness.

The white milky juice, which is very sticky, renders an unripe fruit uneatable, and in an over-ripe one, the stringyness as well as strong smell makes it equally unpalatable. An ideal fruit should have the pulp firm but neither soft nor hard, and a pale yellow colour, when it will be found sweet and of a most agreeable flavour.

In its native countries the fruit is considered a delicacy; natives will pay 1s. to 1s. 4d. each for them, and Europeans become exceedingly fond of them. The pulp may also be cooked in various ways; I have had it boiled in milk, cooked in custards, fried in batter, and preserved in honey. In the latter form it is an excellent dessert. Bernays, in his "Cultural Industries," gives a receipt for boiling in milk, from which, however, the pulp would subsequently seem to be strained off.

In opening a fruit, the rind, which is about half-an-inch thick, should be cut through and the fruit then broken open. The pulp sacs containing the seed may then be picked out from the surrounding fibres. These should at once be cut open, the seed taken out, and put into a basin of water. The addition of a very little salt to the water improves them, and, it is said, eliminates what little smell may remain. If strained and served up promptly with icing sugar sifted over, they are not only palatable but excellent eating and quite odourless.

However, although it cannot be said that in this case "all love Jack," still all concur in attesting to the excellence of the nuts when roasted. These may be roasted like English chestnuts, which they much resemble, or boiled and used in curries or stews. After being boiled they are sometimes dried and ground, and cakes and nutritious farinaceous foods made from the flour.

The Jack-tree is also useful as a timber tree. The wood is a bright yellow when first cut, and is hard. It soons turns darker on exposure, however, and when old and polished compares very favourably with mahogany in durability, beauty of grain, and colour. From India and the South Seas the timber is sent to England, where it is used for cabinet and furniture making, and largely in the manufacture of brush backs. It takes a very high polish, and works up very like satin-wood. In India the wood of the roots is used for carving, and small boxes and articles of this wood, after seasoning and being artificially scented (generally by being packed together with sandal-wood), are passed off as of this more valuable wood. The principal use of the Jack-tree in the Northern portion of this State would be as a fodder, and in this way it would probably prove as valuable as the Algaroba or Mesquit Bean-tree. The leaves are readily eaten by stock, and it is a tree that will grow in a dry as well as in a hot climate. In some of the dry parts of India it is extensively lopped

annually to feed cattle. The fruit also are greedily eaten by all kinds of stock; pigs and calves are very fond of them. The fruit, however, unless allowed to become over-ripe and drop, should be split open. As a shade tree in paddocks it is always green and cool.

Like all other artocarpads, the Jack exudes a considerable quantity of viscid milky juice, from which the best birdlime is made in India. This sap is also used, mixed with other material, for caulking small boats and canoes. A yellow or khaki dye is extracted from the wood, bark, and roots (and Bernays says, also by boiling the sawdust). As an ornamental tree in tropical landscape gardening it is in demand, and in farmyards or their vicinity is a grateful as well as a handsome shade, and if used for no other purpose adds considerably to the too little used compost manure heap by its shed leaves and fruit.

As a shade for coffee it is popular in some parts, especially steep land where the soil is a bad retainer of moisture. I have also seen the leaves plaited or pinned together with thorns to make plates for the native's meals of rice, &c. Altogether, the tree is thought highly of, and considered second only to the breadfruit in economic value in its native land, where it is one of the few trees left standing and preserved when new scrub land is opened for cultivation.

In India several seeds are often sown together and the young plants subsequently grafted together into one stem by approach, making a stronger and somewhat quicker growing tree. This is supposed to make the tree come into bearing earlier also, but this is very doubtful. Bernays states that whole fruit are planted for subsequent grafting as above. I have not seen this done, but, if the whole 100 or 200 seed germinated, the subsequent grafting or inarching must prove a somewhat complicated process. In the same article by Bernays, which is about the best I have yet met with on this too little appreciated tree, a method of growing a long stem is described which I have carried out with some success. By this method of cultivation the seedling Jack is made to grow up a hollow bamboo till 2½ to 3 feet high; then the stem, which is thin and pliable, is twisted round like a spring or corkscrew—more often in one large circle—on the ground and covered in with earth. This stem grows with the tree, and, if bearing on the stem and branches is discouraged, will often bear on the buried portion of the stem. This procedure is not invariably successful, however. It is an experiment easily made, and the root fruit, if obtained, is so vastly superior to others as to be well worth the time and trouble. The first indication of a root fruit is a slight upheaval of the ground, which subsequently cracks, and before ripening one-half of the fruit becomes visible. The root-fruiting tree is, I think rightly, considered a distinct variety. The seed of the true fruit is said to invariably produce true root-bearing stock, which the seed of artificially induced crops will not do, of course.

The Jack-tree is said not to bear at all if the roots reach permanent water; but this also is not authenticated. It may be propagated by cuttings, but seed is so readily germinated that recourse to the more troublesome method is unnecessary. The seed, however, quickly loses its vitality, especially upon becoming dry, and to this cause failure to germinate them can be often ascribed. For seed, the ripest fruit should be taken. Fruit that has dropped from the tree and squashed gives good seed for immediate planting; but, should seed be required to despatch even on a comparatively short journey, fruit not quite ripe should be chosen. Some say, only fruit from the stem should be taken for seed, but I have raised equally good plants and trees from fruit from the branches.

As stated, the seed germinates freely. Frequently, on opening the fruit, especially if over-ripe, the seed will be found to have already germinated, and to have a root 1 to 2 inches long. The spike will be quite small, however, and possibly only just emerging from the germ. But if this root be broken, and it is very brittle, that seed is lost. The seed, which is about 1 inch long and ½-inch in diameter, will be found within a small cocoon-like bag inside the edible pulp. This peculiar bag is quite loose, and feels not unlike thin wash-

leather; it should not be removed either when setting for germination or for cooking. Beneath this again is another thin skin, generally red or reddish, and adhering to the seed itself. In roasting or boiling it readily flakes off like the inner skin of a peanut, which it resembles in colour and texture.

It seldom takes long to germinate, generally showing up in a few days. As may be gathered from the foregoing, the root growth is especially rapid, and a plant 6 inches above ground will be found to have quite a foot of tap root. When about the size when plants are usually transplanted, it has often too much root to safely allow of its removal without a great deal of trouble. For this reason it is often advisable to set the seeds in the field or where the tree is intended to be allowed to grow. The seedling is very hardy; but if planted out where most useful—*i.e.*, in the paddock—will require guarding for a year or two until out of reach of stock, for they will promptly eat it down if they can get at it.

The tree requires a soil fairly free from large rocks or bedrock rather than a loose soil. I have known them thrive among boulders, but die out, even at ten years of age, when sheet-rock was met with 8 feet below the surface. They do not require rich soil nor heavy rainfall. Once established they draw moisture from great depths to the surface, and, while immediately under them the shade may be too dense for grass, pasture luxuriates in their immediate vicinity. For a hardwood tree it is quick growing, attaining a height of 15 to 20 feet in four years, and usually coming into bearing about that time.

QUEENSLAND CITRUS-GROWERS' ASSOCIATION.

We have received from Mr. R. M. Cooper, secretary of the above association, a few particulars concerning its formation and working.

It sprang into existence at a meeting held at the Department of Agriculture, under the presidency of Mr. A. H. Benson, on 8th January, 1902, when the following gentlemen were present as delegates, representing various fruit-growing centres:—Messrs. W. H. Parker, Enoggera (Queensland Fruit and Economic Plant Growers' Association); Wm. Fielding, Redland Bay; L. Hugonin, Wellington Point (Wellington Point Agricultural, Horticultural, and Industrial Association); S. F. Walker, Upper Coomera (Agricultural and Pastoral Society of Southern Queensland); J. Holzapfel, Mount Cotton (Mount Cotton and Tingalpa Division Fruit Growers and Farmers' Association); H. Soegaard, Nerang (Southern Queensland and Border Agricultural and Pastoral Association); E. J. Burnett, Buderum Mountain (Buderum Mountain Coffee and Fruit Growers' Association); J. C. Dixon, Mary street, Gympie (Razorback Fruit Growers' Association); J. Rose, junr., Woombye (Maroochy Pastoral, Agricultural, Horticultural, and Industrial Association); B. T. McKay, Gympie and Maryborough (Tinana Farmers and Fruit Growers' Association); J. Tench, Burrum (Burrum District Fruit Growers); A. Philp, junr., Mount Whitestone, Grantham (Lockyer Agricultural and Industrial Society); H. Roessler, Toowoomba (Drayton and Toowoomba Agricultural and Horticultural Society).

A most interesting discussion took place; many valuable opinions were offered; and it was resolved to form the "Queensland Citrus Growers' Association," and the following gentlemen were elected as the committee of management:—Messrs. H. Roessler, Toowoomba; J. C. Dixon, Mary street, Gympie; B. T. McKay, Gympie road, Maryborough; A. Philp, junr., Mount Whitestone, Grantham; W. H. Parker, Glen Retreat, Enoggera.

A most cordial vote of thanks was tendered to Mr. Benson for presiding; and the committee met afterwards and elected Mr. W. H. Parker as chairman of directors.

The selection of secretary resulted in the appointment of Mr. R. M. Cooper, and a strong agent was entrusted with the sale of citrus products in Victoria. Both these gentlemen are under substantial fidelity bonds. Circulars were issued; and, considering the unpropitious season, a fair connection has been created. Up to date the association has handled 11,392 cases of oranges, and a small quantity of pines.

Prices have been satisfactory to most consignors. The North Coast line fruit has been the best, the orchards there having been more favoured with a rainfall. Southern Queensland has suffered so much from want of rain that the yield is scarcely worth mentioning. The Maryborough crop is light, as also that in the Northern districts. Cairns, Bowen, and Rockhampton are joining hands with the association, so that next season its influence should make itself felt all over the citrus fruit districts in the State.

We have also received a circular issued by the association, which gives more specific information to the grower who is seeking for safe way and means of disposing of his crop to the best advantage.

Samoan Cotton. (?)

We have received from Mr. Howard Newport, Instructor in Coffee Culture, a specimen of cotton which has come to him from Samoa, and, as it may possibly be sown by anyone obtaining seed, it is well to notify farmers that the cotton in question is a very poor variety. It is not a Samoan cotton, but is exactly similar in shortness of staple and poor seed to a kind of cotton grown in Carriacou, one of the Grenadine Islands between Grenada and St. Vincent, in the West Indies. Cotton-growing in the West Indies has been abandoned for thirty years, and it only survived in this small island (19 miles in circumference, with a population of 3,000). The proportion of seed to lint in the specimen sent is very large, the seed constituting 64·5 per cent. of the whole. It was quoted lately in the London market at $4\frac{7}{8}$ cents (about $2\frac{1}{2}$d.) per lb.

Experiments are now being carried on in cotton cultivation with good varieties in St. Lucia, Monserrat, and Antigua.

Many years ago we received some of the same variety from the South Seas, and found that, when Uplands cotton was bringing from 1s. 3d. to 1s. 6d. per lb. in London, this was valued at about 7d.

Poultry.

ARTIFICIAL INCUBATION.

By WILLIAM GRAVE.

In the August number of the *Agricultural Journal* I was trying to make plain the best mode of hatching by artificial means—that is, the method I found best—and sincerely trust many readers will derive some benefit from what I have written. I said the first thing necessary was a first-class incubator, and one that would do all that was claimed for it. Well, we have a machine perfect in every respect, no faults whatever, and that machine is George Stahl's "Perfected Excelsior," which you will find plan of below. By this drawing, readers will be quite able to understand the inside working of the best incubator on the market. I have used nearly every make of incubator, and find the Excelsior far and away ahead of anything. It has a perfect heating apparatus, and a perfectly uniform distribution of heat in all parts of the egg chamber; a uniform system of ventilation, by which the atmosphere of the egg chamber can be kept as pure as the outside air; has a proper system of supplying moisture; a perfect automatic control of the temperature, and could be left to itself under all changes of outside temperature. The Excelsior is simplicity itself; it cannot get out of order, because there is nothing to do so. The walls of this machine are double, even the doors; the casing is made of thoroughly kiln-dried linden wood, which will not warp or crack; the inner casing is made of poplar, doubled all round, with a space between, thoroughly packed with mineral wool. This combination offers the greatest resistance to heat or cold, and its non-conducting power is so great that you can place the machine in a room where the temperature is 60 degrees, regulate it, and the temperature may fall to zero or rise to 90 degrees, while the variation inside the machine will not be perceptible. It also has double doors, an inner one of glass, through which the eggs and thermometer may be seen. The outer door is panelled wood, elegantly carved. These machines are as handsome as any piece of furniture, and the tops are double glass.

A hen supplies the necessary heat to bring forth her young by sitting on them, thus the eggs are heated from above; so it is with the Excelsior Incubator, the heat is supplied from the top by the use of an aluminum metal tank, filled with water, the water being heated by a lamp which is fastened to the end of the machine, as shown in the drawing. The regulator is so arranged that the valve acts upon and over the boiler flue, controlling the temperature of the water before it enters the tank. The regulator is a thermostat so placed and corrected as to regulate the heat at the surface of the eggs. Any expansion or contraction of the thermostat, by change of temperature in the machine, causes the regulator to open or close the valve by which the heat from the lamp is made to heat the air and water circulation of the machine, or is to cut off the heat supply, so as to allow the machine to cool slowly. The valve will open without fail at the set temperature, and when the machine has been cooled to a degree or so will certainly close. The ventilation in the Excelsior is perfect. It is effected by taking in a current of air at top of egg chamber, where it is gently heated by the tank and passes downward over top of eggs. While in this warm condition it can be saturated with moisture if desired. The air then passes under the eggs and escapes through the ventilators in the bottom end of the machine.

The egg tray is automatic. The eggs are all turned without moving them from the tray; a slight movement of the hand turns all the eggs at once in a natural way. As soon as the chicks hatch they come in front of the machine, where light enters the glass door; the end of the egg tray is open, and the chicks pass to the nursery beneath. This nursery is an advantage, as the chicks get out of the way of other eggs hatching. The lamp is an all-metal safety lamp; the

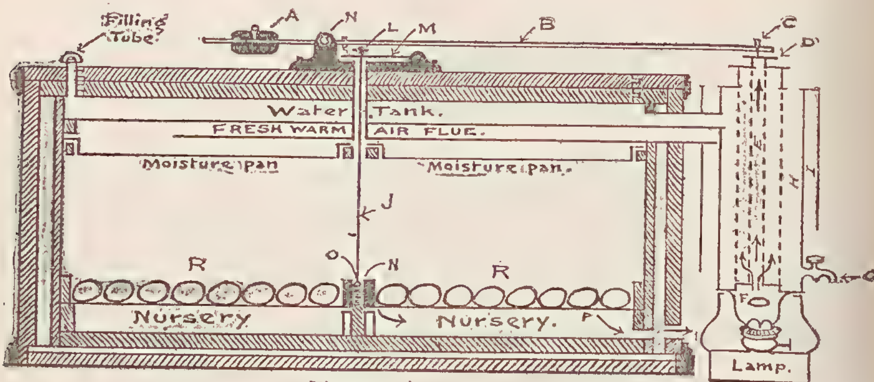
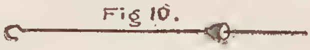


Figure 1

Fig 8.

Fig 9

Fig 10.



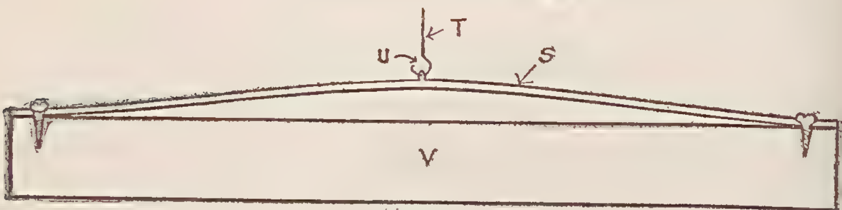


Fig 2.

Fig 3.

Fig 7.

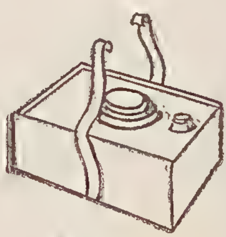


Fig 6.

Fig 4.

Fig 5.

burner is also specially constructed; the chimney is also brass, fitted with mica front, so that the size of the flame may be seen. There is nothing mysterious about this machine, as every part may be seen and understood. I am working forty-five of the Excelsior machines on Messrs. Baynes Brothers' duck plant at Belmont, near Brisbane, and will be pleased to show and explain to visitors at any time.

Fittings.

Fig. A.—Counterpoise weight.
Fig. B.—Lever.
Fig. C.—Screw eyelet.
Fig. D.—Valve.
Fig. E.—Direct flue.
Fig. F.—Chimney.
Fig. G.—Top for running water off.
Fig. H.—Heater.
Fig. I.—Heater jacket or cover.
Fig. J.—Brass rod connecting thermostat and lever.
Fig. K.—Casting on machine and centre of all connections.
Fig. L.—Regulating screw.
Fig. M.—Small lever connected with lever B.
Fig. N.—Thermostat.
Fig. O.—Hook on connecting-rod H.
Fig. P.—Ventilator.
Fig. R.—Eggs in position.

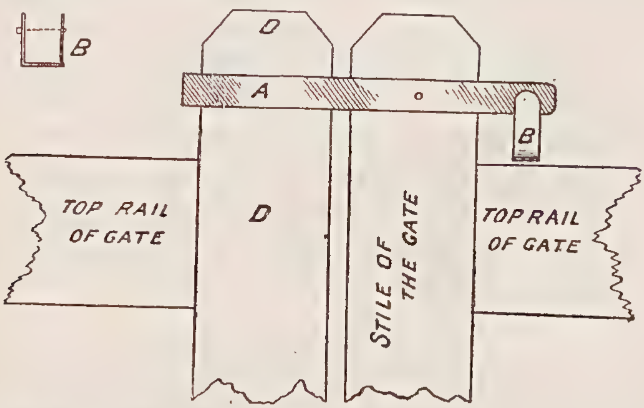
Then there are moisture-pans, water tank, air-flue, &c., all shown in sketch.

Fig. 2.—Thermostatic bar and block showing connecting-rod, eyelet, and bar itself.

Fig. 3.—Casting on top of machine.
Fig. 4.—Valve.
Fig. 5.—Lamp chimney.
Fig. 6.—Lamp.
Fig. 7.—Counterpoise weight.
Fig. 8.—Lever B.
Fig. 9.—Lever M.
Fig. 10.—Connecting-rod J.

GATE FASTENER.

The *Pastoralists' Review* gives the device here shown for securely fastening a gate. The fastener is said to be very handy, most durable, and one which cannot be rubbed off by stock:—



When A is pulled or pushed up, B necessarily falls on the bar of the gate at C and stops A coming off the bar D. B must hang very loose, and should be tossed round so as to lie on top of A when opening the gate. B must hang very loosely, and be made of flat iron, or else a notch put in the wood at C.

Tropical Industries.

COTTON CULTIVATION IN QUEENSLAND.

By DANIEL JONES, Department of Agriculture.

From time to time during the past few years there have appeared in the local Press, and more particularly in the pages of this *Journal*, many articles relating to the subject of cotton cultivation. Statistics relating to probable cost of growth, preparation, markets, freights, &c., have duly been put before the readers of this *Journal*. Thus it will not be incumbent upon me to recapitulate this information, but deal with the subject from the growers' standpoint. The purely mercantile considerations involved in questions such as export or manufacture will be dealt with as occasion may arise. The question of the moment is that the farmer be apprised of such advantages as lie within his grasp in regard to the value of cotton as a field crop for his own personal benefit, and that he be furnished with such information as will assist in bringing this industry once more into the favour it so well merited in past years.

One important factor proved by our local experience and emphasised by scientific investigation in other countries where this crop is largely grown is, that this crop is about the least exhaustive to the soil of any we are acquainted with. Local experience has shown that the richest soils should not be chosen for this crop. Many errors were in this way committed in past years. The less fertile areas would have been far more suited to the cotton plant. Undoubtedly, at times, cotton will need fertilising. This, however, need not concern the planter at the outset of his operations, unless he farms very poor soil, which in Queensland is not very probable.

It will be well for the planter to keep this fact in mind, and not concern himself at first so much about the fertility of the soil as thorough cultivation of that which he crops.

In our past experience we always found that the rich land forced the plant so much to wood that not only was the yield meagre, but the quantity of resulting foliage and wood much retarded picking. This especially was the case in wet seasons, but, on the other hand, in seasons of sparse rainfall, the trouble was not so acute. An illustration of this is seen in this season's experiment at the Acclimatisation Society's plot at Bowen Park, where the dry conditions have so retarded the growth that little difference is noted between plants of very robust growth, such as Sea Island and Egyptian, as compared with the more modest growth of the Upland variety, which, despite the unparalleled dry season, has returned a very fair crop of cotton.

Cotton has always been regarded in Queensland as a dry-season crop. Its vitality under drought conditions is well recognised. The climatic influence most adversely affecting this crop is excessive wet, and to this cause the major part of our losses in the sixties and seventies, when cotton was largely grown, is to be attributed. The cycle seems to have now alternated to the other extreme for some years past; hence the risk from this cause need not, in the Southern part of the colony, be so much feared.

THE VARIETIES TO PLANT

Will much depend on climatic conditions, and as far as many parts of the State are concerned must be, for some time, experimental. In the South, experience thus far has demonstrated that the Upland variety is the best suited to our region.

In the North, probably the longer-stapled varieties, such as Sea Island and Egyptian, will be grown. These three species, differing as they do in texture and length of fibre and value, appear to have become so blended and intercrossed

as to almost conceal the original distinctive features of each species. Broadly speaking, we distinguish Sea Island by the clean black seed and extra long fibre; the Egyptian by its shorter fibre and brown or sometimes pale-green seed with the lint adhering somewhat. The Upland variety is the shortest staple with a grey seed, but is sometimes black in such varieties as the Okra, the fibre adhering closely to it.

An American authority expresses the opinion that the Upland cotton is a hybrid produced by blending the properties of several species under the cultivation of a long series of years. All who know American practice are well aware of the importance cotton-growers attach to such experiments, and we in Queensland can note the advance in quality of cotton grown to-day by comparison of that produced here thirty years ago. The species mentioned as growing in the cotton belt of the United States are given as *Gossypium herbaceum*, L.; *G. roseum*, Tod.; *G. nankin*, Mey.; *G. mexicanum*, Tod.; *G. maritimum*, Tod.; *G. hirsatum*, Mil.; *G. barbadense*, Lin. *G. herbaceum*, the short-stapled variety, is the plant most favoured for cultivation, by reason of its more prolific yield and adaptation to regions where the Sea Island and Egyptian varieties from climatic causes do not prove profitable. So hardy is this plant that its cultivation is of the simplest; more especially is this observed in the Central and North Queensland coastal districts, where it grows uncared for once the seed is sown. The difference in growth of the shrub easily distinguishes the Upland from the other two varieties, the former being much more dwarfed than the others. Sea Island and Egyptian bushes often attain the height of 10 or 12 feet, and make spreading bushes. The Upland confines itself to a modest 4 or 5 feet bush, at the same time developing a denser foliage than the other sorts. This dwarf habit lends itself as more favourable both in regard to tillage operations as well as to the removal of the crop.

In the Central and Northern coastal districts, the Egyptian and Sea Island sorts, in conjunction with the Upland varieties, might well be tried. The specimens which I have seen growing in our Northern districts give no room to doubt but that the long-stapled sorts will do well as far as growth is concerned. The excessive rainfall in these areas will somewhat militate against achieving the best success; and the question resolves itself into the experiment of ascertaining if, by planting the crop at favourable periods, the ripening stage may be carried beyond the rainy season. In the event of this being practicable, there should be no apprehension as to successful cotton cultivation in our Northern regions. Thus far our practical knowledge of districts suitable for this crop is as yet but very meagre. Save for a few isolated patches on the Darling Downs, a few experimental plots North and West, from which I have at various times received fair samples of cotton, Queensland, with the exception of the East and West Moreton districts, represents untried localities. There is every reason to believe that in the interior and drier parts this shrub will thrive, more especially as its drought-resisting qualities surpass most crops in ordinary cultivation. In deciding on varieties to plant, the planter must be guided somewhat by climatic influences. Long-stapled varieties do better in the Northern and more humid parts, and the short-stapled varieties do better in Southern and Western areas.

Preparation of the Soil.

The cotton shrub being a plant depending a great deal on its tap root, which observers will note is the first prominent indication of vitality in the newly bursting seed, moderately deep tillage becomes necessary in order to get the best results. Of course, if grown in a deep, friable soil, so vigorous is the root extension of the shrub that in the short space of a few weeks the tap root penetrates to a depth much beyond the depth usually ploughed. This is undoubtedly one reason why the shrub is able so well to sustain the drought conditions often prevailing. This deep tillage is an advantage; nevertheless, this aspect in past practice did not receive more attention with our local cotton-growers than was usually given to maize or other crops.

The best that was done was to plough about 5 to 6 inches deep, harrow thoroughly and drill, sow the seed, keep the crop clean; and, under even this superficial system of cultivation, the crop throve and yielded well. It is not to be expected that the intending planter can gain complete success by a system of indifferent tillage. So much depends on this feature with respect to yield, quality of fibre, condition of the lint as regards absence or presence of dirt in the form of weed seeds, vegetable matter, soil, &c., that the margin of profit is often materially affected thereby. Thorough tillage means financial advantage, and this must be borne in mind by the intending cotton-grower.

The main essentials, then, in preparing the soil are moderately deep ploughing —cross ploughing also, if necessary; thorough harrowing, to have proper pulverisation and a good seed bed free from lumps, so that the young plant shall be in no danger of the harrow or scuffler rolling on its little crown a mass of soil to its detriment.

These few hints are to the practical farmer scarcely necessary, but perhaps may be of some use as brief reminders to those who are new to the pursuit, and who will need to give attention to them.

SELECTION OF SEED.

The question of selection of seed is, for the present, one that until opportunities arise must to some extent remain in abeyance. Excepting a small supply, in the hands of the Acclimatisation Society, of the Upland, Sea Island, and Egyptian varieties, true to name and all of the best sorts, there is no seed in the State available for distribution, save some Upland variety of mixed but good sorts at the Ipswich Cotton Factory, which has been kindly placed at the disposal of this Department for distribution. Some of this seed, I may say, I have grown this season, and, although it is now some five or six years old, about 50 per cent. appears, by experiments carried on by myself and the Acclimatisation Society, to be fertile seed. Thus, in order to supply the numerous demands made upon this Department, it is proposed in the absence of fresher seed to make distribution of what is available, notifying recipients of the need of allowing for about 50 per cent. of the seed as likely to be unfertile. This simply means sowing double the quantity than would otherwise be needed. Of course those fortunate enough to obtain seed from the Acclimatisation Society, who can only distribute in small quantities, will find that all their seed is fertile, and can sow sparingly.

In general practice, selection of seed is the result of observing and marking off the most prolific and largest podding plants in the field. In selecting, attention should be given to length of staple, texture of lint, strength of fibre, habit of growth, and other features that commend themselves to the planter. Selection in this manner gives the planter good seed for the succeeding sowing, and tends to the evolution of a better cotton plant having the prime points of advantage I have mentioned.

It is recognised that a difficulty often exists in tracing the origin of most of our varieties of cotton. The plant hybridises readily without human aid, and probably the interchange of seed from remote countries so varies the character of the shrub and its staple, causing the recognition of the original very hard to decipher. Most probably we are indebted to the good offices of our insect friends, by reason of their wonderful service as hybridisers in consonance with natural law, for the origin of many of our best varieties of cotton. The cotton-planter will do well to keep this point in view, and make selection of seed from such plants as appear to him to have had the benefit of cross-fertilisation and exhibit good qualities.

The kinds of cotton introduced some years since by the State Department of Agriculture, and which in mixed varieties will be distributed this season, are all of them good species of Upland cotton. Our experience of these fibres in manufacture in the Ipswich mill, and our knowledge of their suitability for plantation purposes in South Queensland, is such that we can recommend them as being varieties worthy of cultivation.

One important point in the selection of seed should not be overlooked—and that is the question of proportion of seed to lint after undergoing the ginning process. When the variety is characterised by large heavy seed and the lint adheres in unduly large quantity, it is wise to discard the same for a variety that does not carry these demerits. Cotton from which the lint can be cleanly removed, and of which the seed is small, will be the most profitable for farmer and merchant. A good variety of Upland, having the merit of small seed and easy and cleanly separation from the lint, will usually yield 300 lb. clean fibre to the 1,000 lb. of unginned cotton. When the ratio of lint to seed goes below that stated, it is time for the planter to seek better varieties. Good varieties grown in West Moreton of the Upland sorts during the period of the cotton company's activity, and which can be recommended, were—Okra, Southern Hope, Jeff Welborn's Pet, Peerless, Jones' Improved, Elsworts, Truitt's Improved, Champion Cluster, Hawkins' Improved.

Sowing the Seed.

Presuming the farmer has his soil in good tilth for his planting operations, his next duty is, in the absence of a properly constructed cotton drill and planter—an implement, unfortunately, as yet not obtainable in Queensland—to sow the seed by hand. He will use a light plough to strike out his drills either by means of guiding poles or with the more expeditious land marker, and care must be taken to have the drills uniform in depth and width, as each operation materially facilitates the subsequent cultivation of the crop. The usual plan adopted is to draw drills about 4 feet apart, 3 inches deep, dropping the seed by hand at such distances as to finally leave a stand of plants 2 feet or 3 feet apart in the drills. When seed is plentiful, it is prudent to sow thickly, and later on thin out the plants to the spaces mentioned. In poor soils, the lesser distance may be settled on, and in richer soils the wider space may be adopted or exceeded as experience of the fertility of the soil may suggest.

Frequently crickets and beetles make havoc among the young plants, destroying numbers while in the succulent tender stage of growth. It is, therefore, not prudent to finally thin out the plants to their standard distances until all danger from this quarter is past.

The seed is sown sometimes after soaking in water for twenty-four hours or so, and this is one advantage when the seed is old or when planting is intended in the absence of sufficient soil moisture, as sometimes happens in planting large areas when the land is quickly drying up. Generally, the seed is sown in the dry state and covered in, awaiting the rainfall. This is, of course, attended with some risk, as in the event of a partial rainfall sufficient moisture may be unavailable to bring the plant above soil, and the germinating seed may perish. This is a contingency that must be faced in all cultural pursuits, and is not common alone to this crop It certainly is more trouble to sow in wet soil, but, on the other hand, when the areas are small and supply of seed a consideration, this system will probably be the safest. The seed can be covered in the drills either by harrowing or, preferably, by removing the front and hind tines of the scuffler, and working the soil into the drill by running this implement up the furrows. This gives good cover, and proves better tillage, and at the same time checks the germination of grass and weeds much better than the harrow does. It must not be forgotten that young cotton plants cannot stand the struggle for existence with weeds, and it is better to safeguard the plant in this way than have it succumb by reason of the struggle with pests and grasses. The number of plants per acre, calculating on distances of 4 feet by 3 feet, is 3,630; on the basis of 4 feet by 2 feet 6 inches, the number is 4,356.

Theoretically, 1 lb. of seed should be about sufficient for 1 acre. About 300 seeds weigh 1 oz. I merely wish to mention this fact in view of the scarcity of seed now available, and to indicate a method of sowing without waste. As in all probability the demand for seed this season will exceed the supply, intending planters are advised that by steeping the seed for twenty-four hours or so, and sowing by hand in wet soil, making allowance of about half for unfertile seed (if from the Ipswich stock, if from other sources this

contingency need not be taken into account), a way is demonstrated of meeting the exigencies of the case. Sowing should be completed during October in the Southern part of the State—early in the month is preferable, because the plants thus have a longer growing period, and thus the crop is increased. Cotton is a child of the sun; thus as soon as warmth appears in soil and atmosphere the crop will assert itself.

In our own practice our standard distances were frequently settled for some soils as close as 18 inches to 2 feet apart. This, of course, involves the use of much more seed, and is a question for the planter to determine for himself. American growers, I may state, endorse the system of planting at much the same distances as here indicated. Cotton sown under general conditions as regards moisture and warmth will appear above ground in from three to five days after sowing. Care must be observed that the seed is not buried too deep, 2 to 3 inches being the limit of depth at which it is advisable to sow.

COTTON IN GEORGIA (U.S.A.)

The following varieties of cotton are those most favoured in the Southern States of America:—

	Clean Lint per Acre.	Length of Staple.	Per Cent. of Seed.
Bates' Early	613 lb. ...	1 inch ...	60
Jones' Improved ...	578 „ ...	$\frac{3}{4}$ „ ...	60
Bancroft's Herlong ...	627 „ ...	$1\frac{3}{8}$ „ ...	70
Truitt's Big Boll ...	306 „ ...	$\frac{7}{8}$ „ ...	60
Peterkin	612 „ ...	1 „ ...	70
George Walker ...	621 „ ...	$\frac{7}{8}$ „ ...	60
Tyler's Imperial Chester	537 „ ...	1 „ ...	75

These are placed in order of merit.

COTTON IN THE UNITED STATES.

The latest agricultural returns state that the United States cotton crop of 1899-1900 yielded to the farmers 4,566,000 tons of cotton seed, worth 10·28 dollars per ton, or in the aggregate 46,951,000 dollars. It is not much more than thirty years since cotton seed was thrown away. In most cotton-growing districts its destruction was enforced by law, in order to avoid the poisoning of streams or the destruction of cattle. In 1870 practically all the cotton-seed oil was exported, and its value was 15,000 dollars. The exports of cotton oil in 1900 were 49,357,000 gallons, worth 16,521,000 dollars. The seed crushed represented only half the available supply.

Of the by-products there were 900,000 tons of cake and meal of the value of 16,000,000 dollars at the mill. Over one-half of this was exported to Europe for cattle feed. The remainder was consumed at home, chiefly as fertiliser in the South, mixed as follows: $\frac{1}{4}$ cotton meal, $\frac{1}{4}$ potash, &c., $\frac{1}{2}$ phosphate rock. Another by-product are the hulls—in 1900, 1,200,000 tons—which are used for cattle feed, hundreds of thousands of cattle being fattened with it, and now experiments have shown that excellent use can be made of them as paper stocks. The linters (short lint) recovered from the seed—over 57,000,000 lb. in 1900—are used as filling for cheap cotton materials, carpets, wadding, &c.

Low middling New Orleans Uplands cotton is worth up to 6d. per lb. With the by-products there is much money in cotton-growing, and again we advise the Queensland farmers to add this crop to others. There is too much of the one-crop business in Queensland. We know of cases in the North where farmers grow nothing but corn. A bad season comes, and there is not half a crop. Then they declare that "Cockatooing don't pay," yet their neighbours are hard at work picking coffee at the rate of 10 cwt. per acre. Why not grow coffee and corn in conjunction with cotton and sugar and cassava?

BLIGHTED COFFEE.

The following remarks which we take from the *Journal of the Jamaica Agricultural Society*, may be taken to heart by careless coffee-growers in Queensland, if there be such:—

On a sample of "blighted" coffee sent in from the Hanover Branch, Mr. Cradwick reports:—"I am only too familiar with the 'blighted coffee' sent me by you. The cause is chiefly '*cussedness*.' The old wood is left on the trees until it becomes quite leafless, or rotten, nearly so, before the crop. The effort to produce a crop on such wood leads to the complete exhaustion of the wood; any few leaves that may have been on it drop off, so berries are left on, which immediately commence to blight, burn, or whatever name you like to apply. It is one of the most difficult things I have ever undertaken, the instilling into the minds of the people that after the wood has done its work it is worse than useless. If it bears, it bears bad coffee, and that bad coffee is produced at the expense of the other wood on the trees which would bear good coffee and more of it, if the older useless wood were cut off. Manuring, feeding the trees, will materially help to prevent blight, as blight is simply starvation." [The remedy is plain: 1, a thorough pruning, and regular pruning after every crop thereafter; 2, thinning out shade if too heavy; 3, a little stirring of the soil; and 4, a good thick sprinkling of wood-ash round the trees, besides any other manure that can be got.—Ed. *J.J.A.S.*]

CASSAVA.

A rainfall of 14 inches per annum is sufficient to secure a heavy crop of cassava, as it is peculiarly drought-resisting and will flourish in arid regions as well as in themost humid. Thus the dry West of Queensland is just as suitable for the plant as the wet North. An acre of cassava is worth more than an acre of sugar-cane. The actual profit on feeding steers on cassava is nearly 50 per cent., on corn-fed steers it is 15 per cent.; and as to cost, it is two-thirds in favour of cassava. By fattening beef on cassava a profit of 59·10 per cent. was made at the Florida Experimental Station. An acre producing 40 bushels of corn yields 1,187 lb. of starch; while an acre of cassava producing 6 tons would yield 2,400 lb. of starch. The latter contains 3 per cent. of sugar and 1·68 per cent. of fibre. Corn contains ·4 per cent. of sugar and 2·20 per cent. of fibre. This fact points to a grand opening for glucose manufactories. Cassava can be successfully grown to produce an average of 9 tons of tubers per acre over the whole length and breadth of Queensland, and, with a certain quantity of fertilisers, the sandiest soils may be made productive of good cassava crops.

TOBACCO NOTES AND CLIPPINGS.

By R. S. NEVILL.

The growing of tobacco under shade in the United States is increasing rapidly; and Connecticut, by this new process, is now able to produce an exceedingly fine, thin, silky wrapper. Some leading manufacturers are now proposing to put out their finest brands of Cuban cigars covered with these wrappers.

The report of the Census Bureau covering the tobacco industry in 1900 shows the capital invested in it was \$124,089,871$\frac{00}{100}$. This does not include the capital stock of the manufacturing concerns. There were 15,252 manufacturing establishments, and the value of their output was \$283,076,546$\frac{00}{100}$.

The crop of 1900 in the United States was 868,163,275 lb., grown on 1,101,483 acres of land, representing 308,317 farms.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1901.						1902.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.
North.													
Bowen	0·10	6·36	0·18	0·93	0·92	0·71	0·19	2·19	2·01	0·68	Nil.	0·44	0·11
Cairns	0·89	2·53	1·82	2·34	5·23	2·78	3·79	12·90	11·43	3·48	2·34	4·97	3·87
Geraldton	2·58	11·77	3·37	3·85	6·45	1·60	3·78	16·87	7·55	12·83	5·39	8·10	7·32
Herberton	0·64	2·53	1·04	4·92	1·13	1·30	0·57	5·77	3·86	1·54	1·07	1·58	2·05
Hughenden	Nil.	0·33	Nil.	0·31	0·29	1·43	1·57	2·02	0·53	*	Nil.	Nil.	Nil.
Kamerunga	2·60	1·94	1·72	1·19	5·74	2·16	2·58	10·59	14·24	3·40	2·63	5·12	4·00
Longreach	Nil.	0·37	0·58	Nil.	Nil.	1·71	0·87	0·27	0·18	0·03	0·03	Nil.	Nil.
Lucinda	2·17	5·89	0·30	2·59	Nil.	0·32	3·55	11·38	2·67	1·78	*	0·63	0·21
Mackay	1·07	5·14	2·29	1·35	1·85	0·71	3·78	8·43	4·41	6·73	1·26	2·33	0·59
Rockhampton	2·29	3·04	1·78	0·51	0·41	0·19	4·79	1·36	1·68	0·21	Nil.	Nil.	Nil.
Townsville	0·19	1·87	0·14	0·90	0·16	0·61	2·24	3·14	1·61	0·35	0·04	0·10	Nil.
South.													
Barcaldine	0·63	0·25	0·51	0·54	0·55	0·09	2·39	0·07	0·37	0·02	Nil.	Nil.	Nil.
Beenleigh	1·34	4·49	0·70	3·35	1·35	0·14	2·41	1·82	0·68	0·42	Nil.	0·11	0·62
Biggenden	0·74	2·81	2·11	1·35	0·47	0·92	2·12	0·83	1·80	0·65	Nil.	0·04	0·08
Blackall	0·55	0·44	0·88	0·60	0·97	0·32	1·68	0·34	0·34	0·05	Nil.	0·01	0·01
Brisbane	1·31	3·71	1·30	3·25	1·41	0·75	1·38	2·67	0·76	0·17	0·47	0·06	0·55
Bundaberg	2·01	5·59	1·80	2·18	1·28	Nil.	6·33	0·75	1·99	0·43	0·02	Nil.	0·07
Caboolture	3·70	3·18	1·55	5·01	3·17	3·45	2·29	2·66	1·29	1·99	Nil.	0·03	0·20
Charleville	1·27	0·92	0·32	0·04	0·65	0·96	0·47	0·22	0·42	0·23	Nil.	0·12	Nil.
Dalby	2·83	1·66	1·11	4·09	0·15	0·42	1·65	0·20	0·30	2·00	Nil.	0·15	Nil.
Emerald	0·90	1·74	1·11	Nil.	0·09	0·63	3·28	1·11	0·97	0·30	Nil.	0·01	Nil.
Esk	3·01	3·03	1·72	4·87	1·08	2·20	1·81	1·06	0·75	1·25	Nil.	0·04	0·25
Gatton College ...	1·53	3·23	1·06	3·02	0·86	0·26	2·27	1·58	0·26	*	0·04	0·03	0·04
Gayndah	2·29	Nil.	1·91	2·39	0·04	0·38	2·54	0·51	0·99	0·81	0·29	Nil.	Nil.
Gindie	1·34	1·77	1·81	0·53	0·02	0·57	1·35	1·46	0·78	0·47	Nil.	Nil.	Nil.
Goondiwindi	2·30	1·55	0·67	2·83	0·21	0·20	2·06	0·75	1·20	0·06	0·02	0·41	Nil.
Gympie	3·40	3·39	1·34	1·91	1·34	1·25	1·49	1·65	2·33	1·09	0·23	Nil.	0·36
Ipswich	0·97	2·47	3·54	3·98	1·17	0·35	1·45	2·80	0·32	0·03	0·02	0·15	0·31
Laidley	2·00	5·32	1·22	3·37	1·10	1·65	1·79	1·94	0·39	0·10	0·20	0·06	Nil.
Maryborough	3·07	5·02	1·05	1·54	1·84	1·54	1·29	0·75	0·96	1·57	0·36	0·24	0·29
Nambour	6·80	4·42	0·98	3·89	2·85	3·89	1·30	2·06	1·61	†	0·26	0·04	*
Nerang	0·79	5·41	0·88	4·57	2·70	0·46	3·98	4·54	0·65	0·65	0·35	0·52	1·07
Roma	2·26	0·98	0·43	0·71	0·54	0·83	2·72	1·11	0·54	0·15	Nil.	0·20	Nil.
Stanthorpe	1·52	4·22	1·42	2·93	2·22	1·67	3·17	0·51	0·56	0·10	0·87	0·78	0·15
Tambo	0·73	0·74	1·47	0·51	Nil.	0·16	1·73	0·35	0·68	0·04	Nil.	0·01	Nil.
Taroom	2·74	2·34	2·11	0·92	0·42	0·31	0·53	1·82	1·30	0·33	Nil.	Nil.	Nil.
Tewantin	8·34	4·61	2·71	3·26	1·66	2·70	3·09	1·13	3·44	2·84	0·80	0·91	0·91
Texas	1·00	3·06	1·47	1·47	0·26	0·43	1·95	1·62	0·42	Nil.	Nil.	0·88	Nil.
Toowoomba	2·22	5·57	1·85	4·45	1·10	0·87	3·46	1·20	Nil.	0·79	0·03	0·38	0·19
Warwick	1·57	5·74	2·05	3·12	1·19	0·71	3·48	0·65	0·55	Nil.	0·15	0·63	0·20
Westbrook	1·64	6·50	1·75	2·27	0·59	0·31	3·21	1·04	0·06	0·41	Nil.	0·28	0·06

* Returns not yet received. † Data unreliable.

CLEMENT L. WRAGGE,
Wragge's Weather Bureau.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

Butter.—Choicest salt Canadian, 96s. to 100s.; finest, 94s. to 96s. Danish, choicest, 104s. to 106s.; finest, 100s. to 102s. No quotations for Australian and New Zealand.

Cheese (duty free).—American, 48s. to 49s.; Canadian, 49s. to 50s. New Zealand, 50s. to 51s. per cwt.

Condensed Milk.—18s. 6d. to 20s. 6d. per case in 20-case lots.

Sugar (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £16 to £17 10s. per ton; raw, £11 to £15 10s. per ton. German beet, 88 per cent., 6s. 6d. to 6s. 9d. per cwt.

Syrups (duty, 2s. per cwt. and ¼ per cent.).—Finest, 14s. to 17s. 6d. per cwt.

Molasses (duty, 2s. per cwt. and ¼ per cent.).—5s. 9d. to 8s. per cwt.

Rice (duty 3d. per cwt.).—Rangoon, £7 10s. to £14; Japan, £12 to £17; Java, £18 to £24; Patna, £17 to £21.

Coffee (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 46s. to 102s.; peaberry, 75s. to 120s.; Santos, 27s. to 62s.; Mocha, 60s. to 90s.; Jamaica, finest, 98s. to 120s. per cwt.

Arrowroot.—St. Vincent, 4d. to 7d.; Natal, 5d. to 8d.; Bermuda, 1s. 4d. to 1s. 8d. per lb.

Wheat.—Australian, white, 33s. 3d.; New Zealand, white, no quotation; Duluth, red, 31s. 3d.; Manitoba, red, 31s. 9d. to 32s. per 480 lb.

Flour.—Australian, 24s. per 280 lb.

Malting Barley.—English, 33s. per 448 lb.

Oats.—New Zealand, 26s. 6d. to 28s. per 384 lb.; Canadian, 28s. 6d. to 31s. per 320 lb.

Split Peas.—47s. 6d. per 504 lb.

Ginger.—Japan, 31s. to 34s.; Jamaica, 48s. to 60s.; low and common, 33s. to 38s. per cwt.

Pepper.—Capsicums, 16s. to 80s.; chillies, 34s. to 37s. per cwt.

Tobacco.—American. Messrs. Thomas H. Edwards and Co., Liverpool, report as follows on the Tobacco Trade:—

STRIPS.	1902.	1901.
Western—		
Fillers	— @ 5 @ —	4 @ —
Rather short	5¼ @ 6	5 „ 6
Very middling to middling	6¼ „ 6¾	6¼ „ 7
Good to fine	7 @ 8 @ —	— @ 7¼ @ 8
Burley	6 „ 8½ „ —	5½ „ 8 „ 11
Virginia Dark—		
Fillers	5¼ @ 5¾	4½ @ —
Rather short	6 „ 6¼	5 „ 5½
Very middling to middling	6½ „ 7½	6½ „ 7½
Good to fine	8 „ —	8 @ 9 @ —
Virginia and Carolina Bright—		
Semi-dark	— „ 8	— @ 5½
Semi-bright	8½ @ 9 @ —	5¾ @ 7 @ —
Medium or mixed ...	10 @ 11	8 @ 9
Good to fine	11¼ @ 12½ @ 14	9½ @ 11½ @ 13

LEAF.	1902.	1901.
Western—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade	4 @ —	3¼ @ 4
Medium to good trade	4½ „ 6	4½ „ 6
Burley	7 @ 7½ @ 8	6 @ 7½ @ 8
Virginia Dark—		
Common export ...	— @ —	None.
Short trade	— „ —	3½ @ —
Medium trade ...	4 „ 5	4 „ 5
Good to fine trade ...	5½ „ —	5½ „ —
Virginia and Carolina Bright—		
Common or semi-bright	6 „ 7½	4 „ 6
Medium or mixed ...	8½ @ 10 @ —	6½ @ 8 @ —
Good to fine	11 „ 12 „ 15	9½ @ 11 @ 15

Wine.—Australian Burgundy: Wotonga, red, 13s.; Waratah, red, 18s., per dozen bottles. Quart flagons, per dozen, 17s. and 23s. respectively.

Green Fruit.—Apples, Australian, 11s. to 16s. per case. Oranges, Valencia, from 20s. to 21s. per 420 for common sorts, to 32s. to 45s. for finest selected. Lemons, finest, 22s. to 26s. per case of 420. Bananas, 10s. to 14s. per bunch.

Cotton.—Market in a disturbed state. Quotation, nominal, 6d. per lb. for clean Uplands. Queensland farmers will do well to watch the cotton market.

Cotton Seed.—£7 15s. per ton.

Cotton-seed Oil Cake (decorticated).—£6 5s. to £6 13s. 9d. per ton.

Cotton-seed Oil.—Crude, £21 12s. to £24 5s. per ton.

LINSEED.—52s. 3d. to 55s. 6d. per 416 lb.

LINSEED OIL.—£30 to £30 10s. per ton.

LINSEED OIL CAKE.—£7 12s. 6d. to £7 17s. 6d. per ton.

MANILLA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£33 10s. per ton.

WOOL.—Prices practically unchanged since previous wool sales.

FROZEN MEAT.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

	Aug. 2.	Aug. 9.
New Zealand Mutton. (Crossbred Wethers and Merino Ewes.)		
Canterbury	$3\frac{15}{16}$d.	4d.
Dunedin and Southland	$3\frac{13}{16}$d.	$3\frac{13}{16}$d.
North Island	$3\frac{3}{4}$d.	$3\frac{3}{4}$d.
Australian Mutton. (Crossbred and Merino Wethers.)		
Heavy (over 50 lb.)	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
Light (under 50 lb.)	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
River Plate Mutton. (Crossbred and Merino Wethers.)		
Heavy	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
Light	$3\frac{3}{8}$d.	$3\frac{3}{8}$d.
New Zealand Lambs.		
Prime Canterbury (32 lb. to 42 lb.)	$4\frac{5}{8}$d.	$4\frac{13}{16}$d.
Fair average	$4\frac{7}{16}$d.	$4\frac{5}{8}$d.
Australian Lambs.		
Prime (32 lb. to 40 lb.)	None offer-	—
Fair average	ing.	—
New Zealand Frozen Beef.		
Ox, fores (100 lb. to 200 lb.) ...	$3\frac{3}{4}$d.	$3\frac{7}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$5\frac{1}{4}$d.	$5\frac{3}{8}$d.
Australian Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	$3\frac{5}{8}$d.	$3\frac{5}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	5d.	$5\frac{1}{8}$d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations of Australian and New Zealand lambs do not include sales of small lambs or heavies or inferior quality.

EGGS.—French, 8s. 6d. to 9s.; Danish, 6s. to 8s. 9d. per 120.

BACON.—Irish, 64s. to 68s.; American, 52s. to 54s.; Canadian, 58s. to 60s. per cwt.

HAMS.—Irish, 88s. to 104s.; American, 56s. to 62s. per cwt.

TALLOW.—Beef, fine, £33 10s.; medium, £30 10s.; mutton, fine, £38; medium, £33 10s. per ton.

General Notes.

MALTING BARLEY.—A CORRECTION.

In our report of the discussion on Mr. V. C. Redwood's paper on "How to Grow Barley for Malting Purposes," read at the late Agricultural Conference at Toowoomba, Mr. Redwood is made to say that in 1896 there were "pretty nearly a quarter of a million *bags* of barley grown on the Downs." This is obviously an error. What Mr. Redwood did say was, that about a quarter of a million *bushels* were produced.

MEAD, OR HONEY BEER.

After the honey is strained from the comb, soak the comb in water till all the sweetness is extracted. Then strain the comb and boil the liquid. After this, bottle it when fermented, which will take from two to five days. It will then be ready for use. Water sweetened with honey will do as well.

WATER HYACINTH AS A FODDER.

During the present drought, and indeed before it, we have noticed cattle feeding on the leaves of the water hyacinth. We are not aware whether any dairy farmers in the districts pestered with this weed have tried it as a fodder for their stock, but it seems that elsewhere it is appreciated for the purpose. *Amateur Gardening* says:—"The water hyacinth is not a native of Florida, but was introduced there about twelve years ago from Venezuela. It is still a great nuisance, but it has been proved to be excellent fodder for cows, so that farmers are filling useless ponds and lakes with the plant, as 1 acre of water covered with the water hyacinth is equal in value to 5 acres of the best grass."

A SIMPLE REMEDY.

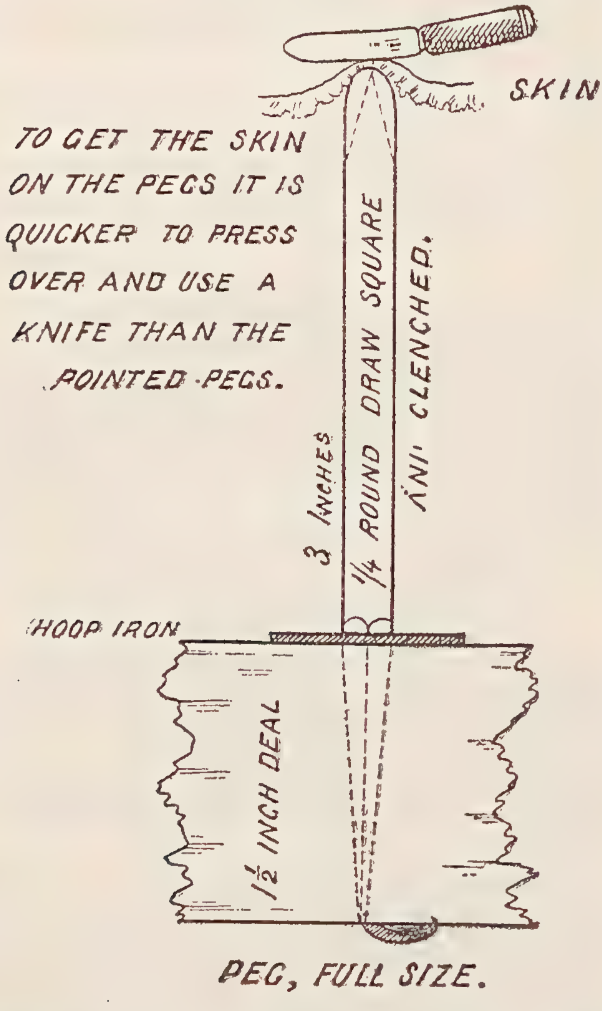
An American paper supplies a very simple remedy for extracting a foreign substance from the nose of a child. A little boy got a damson stone up his nose, and, in trying to get it out, pushed it so far up the nostril that only the tip of the seed could be seen. After trying different ways to extract it, and only succeeding in pushing it further up, he was taken to the doctor, who merely put one finger on the opposite nostril to close it, and blew in his mouth; the seed dropped out. So simple a remedy may be worth much to parents who live miles from a doctor.

FRAME-DRIED SHEEPSKINS.

The accompanying sketches and description of a frame for drying sheepskins we take from the *Pastoralists' Review*. The device should prove of equal service for stretching and drying marsupial skins, giving them the square shape demanded by buyers:—

Mr. Alexander J. McDonald, manager for Captain Percy Chirnside, at Werribee Manor, Victoria, and formerly manager of Cordillo Downs in Western Queensland, kindly permits us to publish the following sketches of frames for drying sheepskins on a South Australian plan. Stretching the skins makes, by general admission in Adelaide, a great improvement in the value, and the same result has followed in the Geelong market, where Captain Chirnside has recently

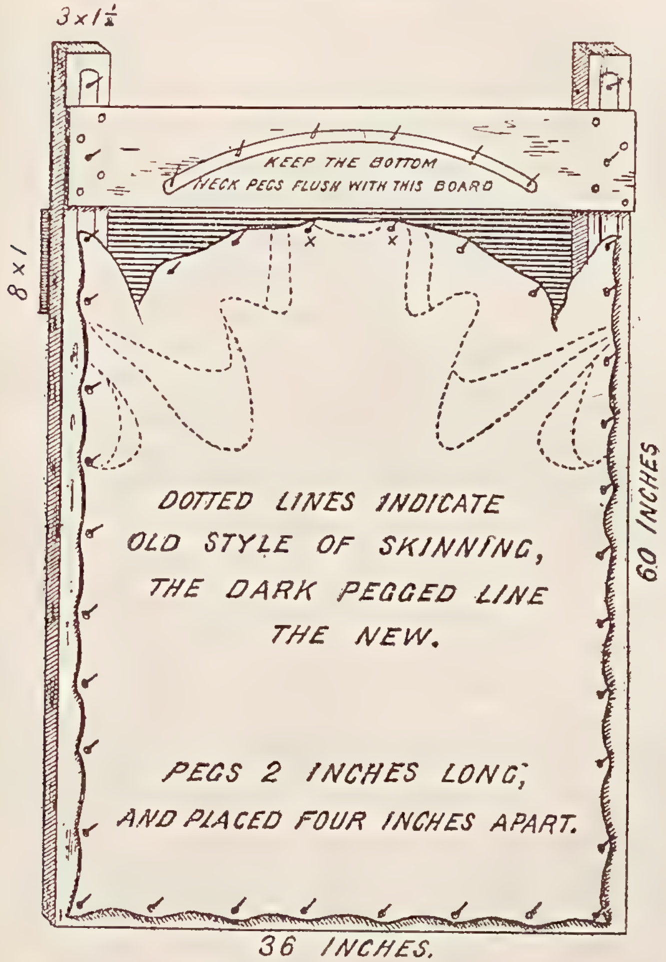
sold some skins stretched in this way. Mr. McDonald writes:—All our skin-frames are of the one fixed width, but having two fixed lengths—viz., for large and smaller skins. It has been accepted that two shifts amply meet requirements, and I impress that we do not aim to "stretch," but simply to dry them on the frames. You will see that we use fixed iron spikes, as we find them handiest and quickest, and do not become lost or missing when wanted. To place a skin squarely upon the frame, first fix the tail, and then the neck, as shown by the pegs marked XX. When the pegging is completed, the skin will bag freely in the centre. As the skin dries, this bagging appearance will take up and become quite tight, but with no undue strain upon the frame pegs.



PEG, FULL SIZE.

While the skin is moist, or before it is quite dry, carefully apply your anti-weevil compound over the entire surface, especially round the skirting; then dry strictly in the shade, standing the frames against the wall, with the neck end downwards. To take the skin off, start at the tail end, and gently pull the skin off that line of pegs; this done, the rest is the act of an instant, for the skin with one pull will leave the frame, the lean of the pegs facilitating the act. Before stacking the skins, give the reverse sides of the four woolless

parts of a coat of the weevil compo., then stack the skins upon a level, dry surface, with the flesh side down in every instance, so that the wool may still ontinue to be an outside protection to the pelt. In skinning, the sheep have



to be opened in the same manner as kangaroos are skinned, which gives the rounded necks and square britch, and ultimately a full square basil from the tanner.

PICKLES, AND HOW TO MAKE THEM.

The general rules to be observed (says *Garden and Field*) are—

1. Avoid the use of metal vessels; when necessary to boil the vinegar use a porcelain-lined or agate preserving kettle. Use wooden forks and spoons.

2. Be sure the pickles are always completely covered with vinegar, and if symptoms of mould appear boil the vinegar again, adding more spices; if the vinegar is weak, take fresh.

3. Do not boil the vinegar with spices above five minutes.

4. Vessels or cooking utensils should be very clean; anything greasy wil spoil the pickles; also have the jars covered, as exposure to the air will render the pickles soft.

GHERKINS.

Choose young cucumbers, and let them be freshly gathered. Pour over them a strong brine of salt and water boiling hot, cover them close and allow to stand until next day. Stir them gently to remove any sand; drain on a sieve. To every quart of vinegar use ½-oz. each of whole black pepper, ginger, and allspice, 1 oz. mustard seed, and 2 cloves of garlic. Allow the vinegar to become boiling hot, place the pickles in a jar, and pour the boiling water over them. Cover the top of pickles with vine leaves, allow them to stand for a day; if the pickles are not of a good green in colour, heat the vinegar to almost boiling and pour it over them again, covering with fresh vine leaves. (As an additional reason for preparing them at home, it is well known that the fine green colour of "store" pickles is due to the use of copper.) When the pickles are cold, put in a sprig of dill and be sure to cover closely. They will be exceedingly crisp and of a fine green.

INDIA PICKLE.

The vegetables to be employed for this favourite pickle are small hard knots of tender white cabbage, cauliflower in flakes, small cucumbers, green beans, small onions, white radishes half-grown, radish pods, small green peppers, celery, horse-radish, nasturtiums, and garlic.

As all these vegetables do not come in season together, the best method of doing this is to prepare a large jar of pickle at such time of the year as most of the things may be obtained, and add others as they come in season. Thus the pickle will be nearly a year in making, and ought to stand another six months before using, when, if properly managed, it will be excellent, and will keep and continue to improve for years.

One advantage of this plan is that those who grow their own vegetables may gather them from day to day when they are exactly of the proper growth. These are very much better if pickled quite fresh and all of a size, which can scarcely be obtained if they are all pickled at the same time.

The radish pods, peppers, nasturtiums, onions, and eschalots are placed in the spiced vinegar raw, the horse-radish is scraped a little and cut in slices half-an-inch thick. Cauliflower (broken in flakes), beans, cabbage, radishes, and gherkins are placed in a strong hot brine, and allowed to remain two days, when they are drained, and over them is poured a small quantity of hot vinegar without spice.

Cover closely, and when cool drain and put the vegetables in the general jar. Be very careful that every ingredient be perfectly clean and dry, and that the jar be very closely covered every time it has been opened for the addition of fresh vegetables.

For the pickle, to every gallon of good, strong vinegar use 3 oz. of bruised ginger, 1 oz. cloves, ½-oz. each of mace, whole black pepper, and cayenne, 2 oz. each of garlic and eschalots, 3 oz. salt, 2 oz. turmeric, and ¼ lb. ground mustard.

Rub the mustard and turmeric smooth with a little cold vinegar. Place all the spices in vinegar and place over the fire to heat; allow it to become as hot as possible, without boiling; then stir in a little mustard and turmeric. Allow it to become very cold, then put in the vegetables as directed. This process is very simple, and the result is a fine pickle. It is not essential to have every variety of vegetable here mentioned, but all are admissible, and the greater variety the more it is approved.

Answers to Correspondents.

PRESERVING CHILLIE PEPPERS.

E. Bryant, Bli Bli.—

Question.—Please give me advice on the curing of chillies and capsicums.

Answer.—There are two simple methods of curing them. When the chillies are ripening, go over the field once a week, picking all the ripe ones. Leave a long stem on the pod. Expose the pods to the sun for a day to toughen the skins and stems. Then, with a long, slim needle, string them through the stem on strong twine 8 or 9 feet long. When the twine is full, hang it up in a dry, cool shed where there is plenty of ventilation. Be careful not to string any poor or damaged pods. When dry, store them in a dry, cool room, hanging them on poles or nails.

Another, and a good plan if the chillies are to be exported, is one which we know by experience to be good, as we have kept them for twelve months without their changing colour or strength. Make a fairly strong brine. Fill a stone jar or a keg with the chillies, and pour the cold brine over them, filling the vessel to the top. Bung down closely. In two or three months, or even after a longer interval, either strain the brine or make fresh, carefully washing out the vessel. They will keep fresh for a long period.

Zanzibar chillies are quoted by the London *Grocer* at from 34s. to 37s. per cwt.

Capsicums range from 16s. to 80s. per cwt.; long peppers, 55s. to 58s. per cwt.

FLAX SEED.

S. F. Clarke, Pittsworth.—

Question 1.—Are there two sorts of flax seed or linseed (which is correct)? If so, which is the best for grain for commercial purposes?

Answer 1.—Yes. The best to sow for grain is *Linum usitatissimum.* Linseed for growing in this State should be imported from Ireland, and can be procured from Richardson Bros. and Co., 30 Donegal place, Belfast. Import sufficient only for a first-year's crop. The yield being about 12 bushels to the acre, the seed saved from 1 acre would sow about 6. Messrs. Woolfe Bros., of Traralgon, Victoria, grow annually about 200 acres, and you might procure seed from them if you do not care to import.

Question 2.—Is there any demand for cow pea?

Answer 2.—There is a large demand for cow pea. The price in Brisbane is from 10s. to 15s. per bushel. Average yield, from 15 to 20 bushels per acre. See advertisement in this issue.

GREEN BONES AND DRIED BLOOD.

Enquirer, Toolburra—

Question.—Can bone feed, also dried blood, for feeding fowls be procured from storekeepers generally, or at meat works only. What is the probable price of each?

Answer.—Most produce merchants stock bones and dried blood. The best place to obtain the articles is at some meat works. Messrs. Baynes Bros., Queensport Meat Works (office, Stanley street, South Brisbane), sell them from 6s. 6d. to 10s. per cwt. respectively.

UTILISING SMALL ORANGES.

R. H., Caboolture—

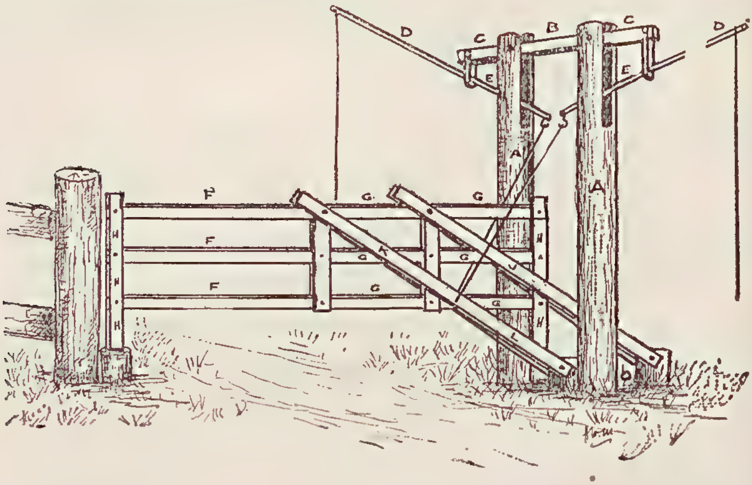
Question.—How can I make use of small oranges?

Answer.—Very small oranges—drought-stricken presumably—contain very little juice. Use the best for preserve and bury the rest.

SKERMAN'S ROAD GATE.

GRAZIER, Taroom.—

Question.—I would be obliged if you would give in next *Journal* the exact measurements of the various parts of the gate on Mr. Skerman's farm at Strathpine?



A—Posts, 9 ft. high.
B—3 ft. 2 in. between bolts.
C—1 ft. 6 in. from bolt to end.
D—15 ft. (arm), end to bolt.
E—2 ft. 6 in. (arm), bolt to hook.
F—5 ft. 8 in. gate rail, bolt to bolt.
G—2 ft. 10 in. gate rail, bolt to bolt.
H—1 ft. 4 in. gate end, between rails.
J—7 ft. 3 in. lever.
K—4 ft. 8 in. lever, top end to wire attached.
L—2 ft. 4 in. lever, wire to stump.
O—2 ft. 9 in. between stumps of lever fixings.

Answer.—The diagram herewith will give you the desired information. The measurements given are taken from centre to centre or from dot to dot. Note that there is a post on either side of the gate style A. These posts are not shown in the diagram. When closed, the end A stands between the two.

PLANTING MANGO, ORANGE, AND LEMON TREES.

GABRIEL KIRK, Moonmera, Rockhampton—

Question 1.—What is the right distance apart to plant mango and citrus fruit trees?

Answer 1.—Mangoes, 35 feet each way. Oranges and lemons, 30 feet.

Question 2.—Would it be good to plant potatoes and other small things between, or would you plant the trees closer, and not set anything between?

Answer 2.—Any small crops may be planted between the trees for the first few seasons, provided *deep cultivation and manuring* are followed in the process. This will keep your orchard soil on the "improve" all the while. Without fulfilling the above conditions, you starve out your orchard.

AGRICULTURAL BANK—TIMBERS.

Enquirer, N.C. Line—

Question 1.—Can a person obtain an advance from the Agricultural Bank if he has only his selection as security (the same having been recently selected), when he requires it for the sole purpose of improving it?

Answer 1.—The Agricultural Bank Act says:—The manager, with the approval of the trustees, may, upon the application of any owner *or occupier* of agricultural lands, held under the laws in force for the time being relating to Crown lands as an agricultural farm, agricultural homestead, grazing farm, grazing homestead, or unconditional selection, make advances to such owner or occupier on the prescribed security for the purpose of making the prescribed improvements on his holding. No advance shall exceed thirteen shillings in the pound of the fair estimated value of the improvements proposed to be made.

Timbers.

Question 2.—Can you tell me the names of the timbers of which I forward samples, and also whether they are of value from a milling point of view, and what they are best suited for?

Answer 2.—The Government Botanist, Mr. F. M. Bailey, says, in reference to these specimens:—The one with large leaves would be difficult to determine without a flowering or fruiting specimen. The one with smaller leaves is *Grevillea Hilliana*, one of the Silky Oaks, and should be as suitable a timber as the Common Silky Oak, which is used for various purposes in upholstering and for staves.

BLACKLEG.

A. S. Sassauve, Lowmead—

Question 1.—Can you inform me at what age the setons should be inserted in the calves' dewlaps?

Answer 1.—Since the malady generally attacks calves which are from three to six months old, preventive measures should be adopted before then.

Question 2.—At what season is blackleg most prevalent?

Answer 2.—The complaint seems to break out more particularly in the *spring* and in the *autumn.*

Question 3.—What are the symptoms by which it is most easily distinguished by amateurs?

Answer 3.—*Symptoms:* There is an effusion of fluid into the tissue beneath the skin and in those which lie beneath the muscles of one or more of the legs, or between those of one hind limb and one fore limb. As a consequence of this swelling or those swellings, the animal moves with pain and difficulty. The swelling becomes insensible to the touch and to cold, and when it is pressed upon it crepitates (crackles), owing to the pressure of gases in the tissues. This crackling is very significant.

Note.—The operation of *setoning* is not altogether a certain preventive, whilst a single inoculation with protective *vaccine* confers immunity. (The protective vaccine may be obtained from any duly qualified veterinary surgeon.)

FRUIT TREES DYING.

Mr. F. BAILEY, Troglium.—The subsoil being the very worst kind for fruit trees, the inference is that the mango can stand ill-treatment better than the orange or loquat. The thriving of the former has nothing to do with the root system, which is often dissimilar in trees of the same species. The land should be drained.

DATE PLUMS.

BOROREN—

Question.—Where can I procure date plums suitable for cooking?

Answer.—There are no date plums (persimmons) in the market at present. The trees can be obtained in quantity from Mr. John Williams, Broadwater Nursery, Mount Gravatt, Brisbane. The best seedless varieties are Yemon (Williams' seedless), Hatcheya (Nightingale's seedless), and Tanenashi.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	AUGUST. Top Prices.
Apples, eating, per case	12s. 6d.
Apples, cooking, per case	7s.
Oranges, per case	7s. 3d.
Mandarins, per case	13s.
Lemons, per case	10s. 6d.
Passions, per half gin case	6s. 6d.
Tomatoes, per quarter-case	5s.
Limes, per case	6s.
Cape Gooseberries, per quart	5d.
Citrons, per cwt.	9s.
Seville Oranges, per cwt.	10s. 6d.
Cumquats, per quarter-case	2s. 6d.
Mangoes, per quarter-case	4s.
Pineapples, per dozen	5s.
Queen Pineapples, per dozen	5s. 6d.
Bananas, per bunch	6d. to 1s. 6d.
Bananas, per dozen	$2\frac{1}{2}$d.

AVERAGE TOP PRICES FOR JULY.

Article.		JULY. Top Prices. £ s. d.
Bacon	lb.	0 0 8
Bran	ton	7 13 9
Butter, First	lb.	0 1 6½
Butter, Second	"	0 1 3¼
Chaff, Mixed	ton	6 17 6
Chaff, Oaten	"	6 10 0
Chaff, Lucerne	"	12 12 6
Chaff, Wheaten	"	5 10 0
Cheese	lb.	0 0 9¾
Flour	ton	10 10 0
Hay, Oaten	"	6 0 0
Hay, Lucerne	"	11 7 6
Honey	lb.	0 0 3
Rice, Japan (Bond)	ton	15 0 0
Maize	bush.	0 5 6¾
Oats	"	0 4 0
Pollard	ton	7 18 9
Potatoes	"	6 11 3
Potatoes, Sweet	"	*
Pumpkins	"	5 7 6
Sugar, White	"	19 13 9
Sugar, Yellow	"	16 10 0
Sugar, Ration	"	14 0 0
Wheat	bush.	0 4 7¼
Onions	cwt.	0 8 8¼
Hams	lb.	0 0 11¼
Eggs	doz.	0 1 3
Fowls	pair	0 3 9
Geese	"	0 5 9
Ducks, English	"	0 3 7¾
Ducks, Muscovy	"	0 4 2¼
Turkeys, Hens	"	0 7 3
Turkeys, Gobblers	"	0 18 0

* None sold during the month.

ENOGGERA SALES.

Article.	JULY. Top Prices. £ s. d.
Bullocks	13 3 1½
Cows	9 16 3
Wethers, Merino	1 2 7½
Ewes, Merino	0 17 8¼
Wethers, C.B.	1 4 3¾
Ewes, C.B.	0 19 11
Lambs	0 13 0
Baconers	2 11 9
Porkers	1 10 4½
Slips	0 9 7½

Orchard Notes for September.

By ALBERT H. BENSON.

The planting and pruning of all deciduous trees should have been completed even in the coldest districts by the end of August, and during the present month the orchardist should disbud and thumb-prune the young trees as soon as they start out into growth. Judicious thumb-pruning is necessary in order to reduce the number of branches, only those buds being allowed to develop into branches that will be required to form the future head of the tree, all the rest being either removed, or, better still, pinched back and converted into spurs which will eventually bear fruit and which, meanwhile, will produce a tuft of leaves that will tend to strengthen the branch and to protect it from sunburn. Spraying should be continued during the month in the case of deciduous trees attacked by fungus diseases, such as the shot-hole fungus or rust of the apricot and the Windsor pear blight of pears, the material used being Bordeaux Mixture. Where leaf-eating insects of any kind are troublesome, a little Paris green—1 oz. to 10 gallons—should be added to the Bordeaux Mixture, the spraying material being then both an insecticide and fungicide, and two pests are destroyed by the one spraying. Vines that have not been treated for black spot, as described in the Orchard Notes for August, should be treated at once; and vine-planting should be done during the beginning of the month, though if the cuttings have been kept in a cold place planting can be continued all through the month. In planting grape-cuttings, see that the cutting is always planted firmly, and that the soil comes into direct touch with it all round, as, if not, it is very apt to dry out. Plant the cutting with the top eye just on a level with, or rather slightly below, the surface of the ground, not with 6 inches or more of the cutting sticking out of the ground, as the nearer to the ground the main stem of the vine starts the better the vine will be, and the easier will be its subsequent training.

Orange-trees will be in full blossom during the month, and in the earlier districts the young fruit will probably be ready to treat for Maori or rust towards the end of the month. Maori is caused by a very small mite, which begins its attack on the young fruit when it is about the size of a marble, though the injury it causes is seldom noticeable till the fruit begins to ripen. Spraying the trees with a mixture of sulphur and soft soap, or with a weak solution of sulphide of soda, or dusting the trees with fine sulphur, will destroy these mites. During the end of the month pineapple and banana suckers may be set out during favourable weather in the earlier districts, but it is not advisable to plant out too early, as they do not root readily till the soil is thoroughly well warmed. Orchards and vineyards should be kept well cultivated during the month, as if there is a dry spring the success of the crop will depend very much on the manner in which the orchard is kept, as the better the orchard is cultivated the longer it will retain the moisture required by the trees for the proper development of their fruit. Quickly-acting manures, such as sulphate of potash, sulphate of ammonia, and superphosphate, can be applied to fruit trees during the month if there is any suitable showery weather, but should not be applied during either a very dry or very wet spell. Fruit trees should be mulched, and when cow peas are required for mulching they can be planted towards the end of the month.

During the month a careful examination should be made of all fruit to see if any contains larvæ of fruit fly; and if such are found, they should be destroyed, as if extreme care is taken during this and the two following months to destroy the larvæ of all fruit flies, whenever and wherever found, this great curse of the fruitgrower would be greatly reduced, as it is on the careful destruction of the earlier broods of flies that the saving of the main crop of fruit will principally depend. Though the first damage caused by the flies is comparatively insignificant, they reproduce themselves so rapidly that a few mature insects in the beginning of the season become many thousands before it closes.

Farm and Garden Notes for October.

Farm.—We are now in the second month of autumn, and may reasonably look for warmer weather and grateful showers of rain. The weeds will be on the increase, and the labours of the farmer and the gardener will be increased likewise to cope with them. Hence the horse-hoe, hand-hoe, and cultivator will have to be set diligently to work. Whatever you may have to leave undone, do not let the weeds get ahead of you. If you neglect to destroy them, and allow them to go to seed, it means the seven years' weeding for one year's seeding. Earth up growing crops which require it, and keep the ground loose amongst them. Plant sweet potatoes, yams, earthnuts, arrowroot, turmeric, ginger. Sow and plant out tobacco. Sow maize, sorghum, setaria, imphee, Kafir corn, *Paspalum dilatatum.*

Kitchen Garden.—Keep all crops clean; mulch and water when necessary. Cabbages may be planted out, taking care to destroy the aphis by spraying or dusting with tobacco dust as soon as the pest appears. French or kidney beans can now be sown in all parts of the State. Lima beans are a first-class hot-weather vegetable; the hotter the weather, the better the Lima bean likes it. Sow the dwarf kinds in drills 3 feet apart and 18 inches between the plants; the climbing kinds must be sown 6 feet apart each way. Beetroot may still be sown. If cucumbers, melons, squashes, and marrows have not yet been sown, get them in at once, or you will lose the best of the season for these vegetables and fruits. Leaf-eating beetles will probably attack them, but a spray of Paris green or London purple will effectively suppress them. Many gardeners like to grow chillies. Now is the time to sow them. They generally grow here like weeds; but, if you have any particular kind, sow them in boxes or in a seed-bed, and plant out when large enough. You should sow the bird's-eye pepper, which is not much larger than a large grain of wheat, and is very valuable to pickle-makers. It is the hottest of all the chillie family. West Indian gherkins, if you can get the seed, may be sown largely. They meet with a very ready sale for pickle-making. Set out egg plants in rows 4 feet apart. In the cool districts sow a few rows of peas, but in the hotter parts of the State it is a waste of time and money to try and raise peas. Plant out tomatoes at once, 3½ feet each way. Train them on trellises, breaking off the shoots which spring from the junction of the leaf with the main stem. Set out rosellas. Besides the fruit, the plant produces an excellent fibre which can be utilised for tying up plants to stakes and trellises. A very nice wine may be made from the fruit, which is also excellent for pies, puddings, and jam. The fruit may also be dried and stored for winter use. Weeds will be very troublesome now, but it is imperative to keep them down. If you have to water, do it early in the morning or late in the afternoon. Should the soil appear baked next day, stir it with the hoe. A fine soft tilth is of the greatest advantage in the vegetable garden. All plants also are benefited by mulching during hot weather.

Flower Garden.—If you have followed out the directions given for the management of the flower garden during the past three months, you will now be rewarded with bloom of many varieties. Especially should the roses be in full bloom. It is a good time to plant out palms and all kinds of tropical and semi-tropical plants, being careful to give them ample water and shade. Plant chrysanthemums, giving them plenty of water daily. Look out for pests, especially aphis and caterpillar, and spray the plants freely if they appear. Sow dianthus, snapdragon. Plant coleus in the borders. Keep the borders well hoed and the grass edgings trimmed, and keep the lawn-mower going on the grass. Do all the planting as much as possible in dull, showery weather.

IN TROPICAL QUEENSLAND

Continue the planting of bananas. Sow paddy, plant yams, turmeric, sugar-cane, and coffee. Whenever manure is needed, apply stable, cowyard, or meatworks manure. Stake any yams which have begun to climb. Trim olive-trees. Plant out sisal hemp suckers. Keep the coffee plantation clean. In some seasons coffee-trees will bloom during this month. A small picking of Liberian coffee may be made. It is not wise to sow coffee seed now which was picked in the earlier months of the year, germination being doubtful. Sugar-cane crushing will be continued wherever the great drought has allowed the cane to grow to a fair height.

Times of Sunrise and Sunset, 1902.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·30	5·32	5·44	5·2	6·2	4·50	6·24
2 ...	6·5	5·31	5·31	5·45	5·0	6·3	4·50	6·24
3 ...	6·4	5·32	5·29	5·45	4·59	6·5	4·51	6·25
4 ...	6·2	5·32	5·28	5·46	4·58	6·6	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·57	6·7	4·51	6·26
6 ...	6·1	5·33	5·26	5·47	4·57	6·7	4·51	6·28
7 ...	6·0	5·34	5·25	5·47	4·57	6·7	4·51	6·28
8 ...	5·59	5·35	5·24	5·48	4·56	6·8	4·50	6·30
9 ...	5·57	5·35	5·23	5·49	4·56	6·8	4·50	6·30
10 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·31
11 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·32
12 ...	5·54	5·36	5 21	5·49	4·55	6·9	4·50	6·32
13 ...	5·53	5·37	5·20	5·50	4·54	6·10	4·51	6·23
14 ...	5·51	5·37	5·19	5·50	4·54	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·54	6·12	4·52	6·34
16 ...	5·49	5·38	5·18	5·50	4·53	6·13	4·52	6·34
17 ...	5·48	5·38	5·17	5·51	4·52	6·14	4·53	6·35
18 ...	5·47	5·39	5·15	5·51	4·51	6·15	4·53	6·35
19 ...	5·45	5·39	5·15	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·49	6·17	4·54	6·37
21 ...	5·43	5·40	5·13	5·53	4·49	6·18	4·54	6·38
22 ...	5·42	5·40	5·12	5·54	4·49	6·18	4·54	6·38
23 ...	5·41	5·41	5·11	5·55	4·49	6·19	4·55	6·39
24 ...	5·39	5·41	5·9	5·55	4·49	6·19	4·55	6·39
25 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
26 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
27 ...	5·36	5·43	5·7	5·57	4·49	6·21	4·57	6·41
28 ...	5·35	5·43	5·6	5·58	4·49	6·22	4·57	6·41
29 ...	5·34	5·44	5·5	5·59	4·49	6·22	4·58	6·42
30 ...	5·32	5·44	5·4	6·0	4·49	6·23	4·59	6·42
31 ...	...	...	5·3	6·1	...	...	4·59	6·42

PHASES OF THE MOON.

			H.	M.
1 Sept.	●	New Moon	17	19·4
9 ,,	☽	First Quarter	10	14·9
17 ,,	○	Full Moon	6	23·4
24 ,,	☾	Last Quarter	4	31·5
1 Oct.	●	New Moon	5	9·1
9 ,,	☽	First Quarter	5	21·1
16 ,,	○	Full Moon	18	1·1
23 ,,	☾	Last Quarter	10	58·1
30 ,,	●	New Moon	20	13·6
8 Nov.	☽	First Quarter	0	30·5
15 ,,	○	Full Moon	5	6·5
21 ,,	☾	Last Quarter	19	46·9
29 ,,	●	New Moon	14	4·4
7 Dec.	☽	First Quarter	18	26·5
14 ,,	○	Full Moon	15	47·4
21 ,,	☾	Last Quarter	8	0·2
29 ,,	●	New Moon	9	24·8

Agriculture.

FIRST STEPS IN AGRICULTURE.

12th Lesson.

THIRD STAGE.

By A. J. BOYD.

Having now shown you how to start your herd, and how to manage and treat your cows and calves, there is little more that I can tell you in these short lessons. Still, you may as well learn how to prevent the growth of horns. Horns were given to cattle originally for the purpose of defending themselves from the attacks of wild beasts, and of course were very useful to such naturally peaceful animals as cows, deer, sheep, goats, &c. But since man has domesticated these animals and protects them from former dangers which threatened them when in a wild state, the horns are of little use, but are a source of danger to each other and to man. It has been clearly proved that cattle deprived of these weapons are far more docile than those which still retain them. The advantages of DEHORNING, as it is called, are:—

1. It renders horned animals more tractable and peaceable.
2. It prevents their injuring each other.
3. It enables the breeder to put more cattle in a truck for a railway journey, and does away with much injury and suffering during the transit.

Now, how are the horns to be removed? If you allow the animals to retain them until they are full-grown, a powerful cutting instrument is needed to cut them off. The operation is certainly very quickly performed, and, whatever people may say about the painlessness of it, it cannot be but that momentary extreme pain must result. There is a method, however, of preventing the growth of horns in the young calves which, if carefully done, is absolutely painless, yet perfectly effective. It is this:—

When the calf is not more than three weeks old, cut away with a pair of shears or scissors all the hair from the young horn, making a clear space of about the size of a sixpence. You should have ready a small bottle containing a saturated solution of caustic potash, which you can buy cheaply from any chemist. By a saturated solution is meant as much potash as the water can contain without any sediment showing. As soon as any of the potash goes to the bottom, the saturated solution is ready. Add no more. Now, in using this to dehorn calves, there is danger, unless great care is used, of injuring the animal's eyes. To avoid this, take some black oxide of manganese, a very cheap chemical. Fill a phial about half-full of the oxide, then fill up with the solution of caustic potash. Next, with an indiarubber stopper, the end of which is cut in diamonds like an old rubber boot sole, rub the mixture in on the young horn until the appearance of redness is produced. The result will be that the horns will never grow. Now that is simple, easy, and cheap, and you save your stock from a great deal of suffering in after life, besides saving yourself trouble at milking time.

So much for dehorning.

The next thing is the *Tuberculin Test.*

Cattle suffer from a disease called TUBERCULOSIS just as human beings suffer from consumption. Most, if not all, animals are subject to this terrible disease. But it can be cured if taken in time. When dairy cows suffer from it, so long as it does not affect the udder, there will not be found any germs of tuberculosis in the milk supply. You can even raise a healthy herd from diseased

parents. This was actually done by Mr. Pound, the Government Bacteriologist, during his experiments on the St. Helena herd, from which he completely banished the disease.

Now you will ask how you are to know that any of your stock are affected with this disease. To all appearance, the cows are perfectly healthy. But there is a test which can be applied which will reveal its presence. Many will tell you that the test is useless; others will declare that it cannot fail. This is a matter on which, as in the case of many other things, men will always agree to differ. However, I will explain the matter simply to you, and you can use your own judgment afterwards, taking note of what is being done by your neighbours and by dairymen in other parts of the world.

Tuberculin is the name given to the glycerine extract of the poisonous products of the tubercle bacillus. I told you what a bacillus was in a previous lesson. It was given by Dr. Robert Koch, a celebrated German bacteriologist, in 1882.

There is no need for you to know how it is prepared. It is enough to know that when you want it you can always procure it from the Stock Department.

It is always used in a diluted form in the proportion of 1 part tuberculin to 19 parts of a carbolic acid solution of 5 parts in 1,000.

The following doses are required:—

8	cubic centimetres	for	high-class aged bulls
6	,,	,,	medium-sized animals
4	,,	,,	calves six to twelve months old
2	,,	,,	calves under six months.

One cubic centimetre = $\frac{2}{5}$ of a cubic inch.

Example of the method of diluting tuberculin:—$\frac{1}{10}$ cubic centimetre pure tuberculin to $7\frac{6}{10}$ cubic centimetres of the carbolic solution equal 1 part to 19 parts.

The instruments required are very simple.

A strong, well-made HYPODERMIC SYRINGE holding 10 cubic centimetres, with a strong needle attached.

The word HYPODERMIC means under the skin.

Sometimes you will come to the word SUB-CUTANEOUS, which means the same thing. The first comes from two Greek words, the second from two Latin words. You should always try and remember these terms, as scientific men use them because the meaning cannot be so conveniently expressed in English.

The second instrument required is a CLINICAL THERMOMETER, which has a self-registering index.

As this is a very delicate instrument, a special strong one suitable for taking the temperature of horses and cattle has been designed and approved by the Stock Institute. These can both be obtained from the wholesale chemists.

I now come to the APPLICATION OF THE TUBERCULIN TEST.

The discovery of the disease by this test depends entirely on the elevation of the temperature of the beast within a short period after injection. This is the only real difficulty, because allowance must be made for variations in temperature produced by other causes than the injection of the tuberculin.

As a rule, young animals are warmer than old ones. Different animals are unequally affected by differences in atmospheric temperature.

A drink of cold water will lower an animal's temperature for an hour after drinking.

There may be other diseases present.

Then the temperature of the cow's body is altered on the approach of calving.

Fast driving and the excitement produced by it will raise the animal's temperature.

Bearing this in mind, all cattle, except those plainly too ill, should be tested.

Now, suppose you are going to test your herd. Put all the animals into bails or into a crush. Take their temperature at 2 p.m., and again at 6 p.m. on the day of injection. Inject the tuberculin at 6 p.m, passing all cattle whose temperature at 2 p.m. was above 104 degrees.

After injection, take the temperature every three hours, from 6 a.m. to 6 p.m. on the following day, until you find no further rise in temperature, and the *normal* (original, natural) temperature has been resumed.

The method of using the thermometer can be shown you by any dairy farmer or student of the Agricultural College.

You must now learn HOW TO INJECT THE TUBERCULIN. Fill the syringe with the proper dose, and stand on the side of the beast *opposite* to that on which you intend to operate. Reach over the animal with your left hand, and pinch up the skin firmly at the chosen point with the left forefinger and thumb. With the syringe resting in the right palm, the needle between the forefinger and thumb, pierce the skin with a quick thrust, and, while retaining your hold of the folded skin, put your right thumb on the piston, and slowly introduce the contents into the sub-cutaneous tissue. There you have the word *sub-cutaneous* which I explained to you.

Now, if, on the following day, the animal's temperature rises 2½ degrees Fahr. or more, you may consider that it has tuberculosis.

If any rise is less than this, wait two or three weeks, and repeat the injection.

As a rule, with tubercular animals, the temperature will begin rising TWELVE HOURS AFTER injection, that is, at 6 a.m., and by noon it may reach 107 degrees Fahr. In a healthy animal the temperature is 102·4 at 9 a.m. before injection, falling to 100·8 at 12 noon, and rising again to 101·6 at 6 p.m. There is little change after injection in healthy animals. In a diseased beast, whilst the temperature *before injection* is much the same as in the first case, yet *after injection* it will rise to 103·1 at 6 a.m., to 106·9 at 12 noon, falling to 106·1 at 3 p.m., and to 104·8 at 6 p.m.

This change of temperature is called the RE-ACTION. Now, there you have the whole thing in a nutshell.

Finally: Kill all animals showing outward signs of disease, and destroy all carcasses by fire.

Test all the remainder of the herd every six months with tuberculin.

Carefully slaughter and examine all animals of little value, such as old cows or bulls and very young calves that have shown evident re-action to the test. Boil the whole carcasses down for the pigs.

Separate the re-acting animals from the healthy ones by removing them to a distant paddock. Clean and disinfect all the sheds and stalls. All calves born of re-acting mothers should be at once removed before they have a chance to suckle their mothers. They can be fed with the milk of healthy mothers.

Carry out the tests by the help of, or at least in the presence of, an experienced Government official or of a duly qualified veterinary surgeon. These remarks on the tuberculin test are taken from the instructions given by Mr. C. J. Pound, F.R.M.S., Director of the Queensland Bateriological Institute. By the way, I should tell you that the pulse of a cow is felt in front of the shoulder joint.

Questions on Lesson 12.

1. What are the advantages obtained by dehorning cattle?
2. Why should cattle be dehorned in early youth?
3. How is the work of dehorning calves performed?
4. What are the constituents of the solution for dehorning?
5. What is meant by the tuberculin test?
6. Why is this test applied to dairy stock?
7. What is tuberculin? How is it prepared?

   What are the doses for—(*a*) aged bulls; (*b*) medium-sized animals; (*c*) calves from six to twelve months old; (*d*) calves under six months?

8. What is a centimetre in English measure of capacity?
9. Define the terms hypodermic, sub-cutaneous, clinical.
10. What instruments are required for applying the test?
11. How does the test indicate the presence of tuberculosis?
12. What is the normal temperature of a cow's body? What conditions influence this temperature?
13. At what hours should the temperature be taken both before and after injection?
14. How is the test applied?
15. What rise in temperature will show the presence of the disease?
16. Define the term Re-action.
17. The presence of the disease having been proved, what precautions should at once be taken?

13th Lesson.

THIRD STAGE.

I have in the last three lessons given you a fairly sufficient idea of how to start a dairy herd; how to care for, feed, and house your stock; how to deprive your cows of horns painlessly; and how to recognise and overcome the serious disease known as tuberculosis. It remains now to say a word about dealing with milk and cream to the best advantage.

You must remember that I am now writing, not so much for boys, but for young men who have just started for themselves and who have not had the advantage of an education at an agricultural college. You who are in that position, will of course have heard about CREAMERIES, BUTTER FACTORIES, and HOME SEPARATORS, and in connection with the latter, many arguments for and against their use will have come under your notice. Many hold that the home separator is distinctly injurious to the butter industry. Others, on the other hand, and I must say they are in the majority, maintain that the home separator is the dairy farmer's best friend.

Not so many years ago farmers used to set the milk every day in large, shallow pans in which, after a time, the cream rose to the surface and was then skimmed off, and, when sufficient cream was obtained it was churned either in a wooden or tin dash churn or in a revolving one. All this took time and much labour, and, what was worse, the cream imbibed all sorts of bad odours, and dust, flies, and other obnoxious matter fell upon the cream in the setting dishes.

Of late years a machine was invented which separated the cream from the milk without there being any necessity for waiting for it to rise.

Only lately, the separator was introduced into the dairy districts of Siberia, in Russia, and the ignorant Russian farmers were so terrified at the result that they thought some evil spirit controlled the machine, so they fell upon it and smashed it to pieces, and burnt down the creamery building. Now, however, they have been properly instructed in its use and value.

As most of you will have seen a separator at work, a very short description of the machine will suffice.

The new milk is run into a receiver, which revolves at the rate of several thousand revolutions per minute. The heavier particles of the watery part of the milk fly to the outer circumference of the receiver, or bowl, as it may be called, the lighter particles of butter fat being forced to travel in an inner zone. The separated or skim milk is forced out of one tube by a very simple arrangement, and the cream passes out through another.

The separation is most effective at high temperatures, ranging from 80 degrees Fahr. to 98 Fahr. in different machines.

A great advantage that the separator has over shallow setting is, that whereas by the latter plan only 80 per cent. of the butter fat is secured, by using the separator from 92 to 98 per cent. is removed.

Milk must be started on its creaming way as soon as it comes from the cow. If some of it is allowed to get cold before running it through the separator, you will probably lose much of the butter fat in the skim milk, and that is almost a dead loss.

Remember to strain the milk (although it should have already been strained) once more into the receiver of the machine. Turn the handle very slowly at first, increasing gradually till full speed has been attained. It should take from three to five minutes to get up full speed. Watch how the cream runs out. If it runs out with a spiral twist, it is too thin. In that case, stop the machine and adjust the cream-regulating screw. Do not mix freshly separated cream with old cream until it is cold. When cold, you may mix them thoroughly by stirring. Remove the separated milk from the dairy at once. Keep no lid on any cream can while it is in the dairy; merely put a piece of muslin or cheese cloth over the mouth of the can to keep out dust, flies, &c. Send the cream to the factory as soon as possible. When you have finished separating, take the machine to pieces and wash all the parts first in *cold water*, for the reason I gave you in a former lesson on washing milk cans. After this, wash all the parts with *hot* water, and oil where necessary. Never forget that dirt is the great breeder of injurious microbes, so wash down the dairy floor with scalding water. Cleanliness in the dairy and dairy utensils means money in your pocket.

Now, let us see what the ADVANTAGES OF THE HOME SEPARATOR are:—

1. Supplier saves expense of hauling milk to and from the factory.
2. Cream can be gathered from a larger territory with the same hauling facilities.
3. Less number of cans needed to transport material.
4. Skim milk retained at farm in best possible condition for feeding.
5. Every farmer gets his own skim milk; therefore, no difficulty in its division (as now at the factory), and less danger of spreading bovine diseases.
6. Smaller bulk of material to be cooled and cared for.
7. Less sour milk and cream. (It is argued by some that cream will not sour as fast as milk, owing to the reduced proportion of acid-forming material.)
8. Quality of cream better when separated immediately after milking.
9. More thorough separation when run immediately after milking.
10. Cream need not be delivered to factory daily, even in hottest weather.
11. Less chance for farmer to be cheated on tests.
12. Saving of cost and expense of operating separator at factory.
13. Less work at the factory for butter-maker.

Against these advantages, we have the opinion of other dairy farmers who say that the chief cause of the deterioration (*i.e.*, falling off in quality) of our Queensland butter is mainly the introduction of the Home Separator. It alters, they say, the quality of the cream—first, by the different degrees of density at which the separation took place; secondly, by the length of time elapsing before the cream is sent to the factory; thirdly, by the conditions under which the milk is separated. Under the factory system, or rather skimming station system, when the milk from all the neighbouring farms used to be skimmed, 400 lb. to 500 lb. of cream of an even density would be despatched daily to the factory. To-day, this quantity of cream is sent from nine or ten suppliers, each man's cream being of a different density, and its age varying from one to seven or even ten days.

They also maintain that very few proper dairies are constructed on our farms, so that the cream has to lie amidst the most unsanitary conditions, absorbing all sorts of disgusting odours and injurious microbes.

Such are what I may call the *pros* and *cons.* of the subject of the Home Separator. I may tell you this: That the whole objection to the Home

Separator is not against the machine itself, but against the cream which is kept too long by the farmer. Many a man half fills a can with cream, and then keeps it back to save a journey, hoping to fill the can next day. Thus he injures the whole of the cream, and even if he adds salt and stirs it up and mixes it thoroughly together to make a uniform sample, yet the whole will be tainted by the stale cream. Where this occurs, the farmer should try and remember that he not only injures himself but also his neighbour, and, indirectly, he brings Queensland butter into bad repute in the English markets.

In some districts of this State (Gympie, for instance), a carrier goes the rounds of the farms in the afternoon, collects all the cream the farmers have, and next day delivers it at the factory.

This is now all that I propose to teach you in connection with dairying. You will, if you are wise, visit the best dairy farms in your neighbourhood, and thus you may, by intelligent observation and inquiry, gain much valuable information, and you may be sure that such observation of the practice of dairy methods is of far more value to you than all you can learn from books. Theory is all very well, but "practice makes perfect." These things have therefore been written, not for your final instruction, but to lead you on to verify them by practice and by seeing what your successful neighbours are doing. The next lesson will be on the breeding and management of pigs.

Questions on Lesson 13.

1. What are the objections to the old method of setting milk in shallow pans?
2. What machine has been invented to take the place of shallow setting?
3. Describe the machine and its action.
4. What advantage has it in butter-fat production over the old process?
5. When should milk be put into the machine?
6. What would happen if the milk were to be allowed to stand for some time before being operated on?
7. At what stage may you mix old with new cream?
8. Name some of the advantages accruing by use of the machine.
9. What are the disadvantages?
10. How may a farmer injure his neighbour by sending faulty cream to a factory?

14th Lesson.

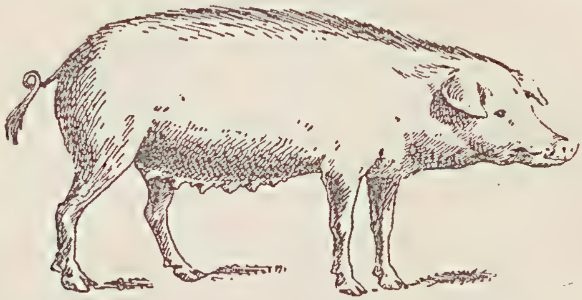
THIRD STAGE.

Intimately connected with dairy farming is the breeding of pigs. No dairy farmer should neglect this industry, because it is a very paying one, and can be conducted in conjunction with dairying at a comparatively moderate expense.

The first lesson you have to learn in connection with pigs is, that by nature, they are very cleanly animals. You often hear a dirty boy called a pig. Well, perhaps the boy is a pig, for the reason that he would be clean if people washed him, and gave him clean clothes, and a clean house and bed. The pig would be clean if people would only allow him to be so. You see a pig wallowing in mud. Why? First, because he wants to cool his body, which is always too warm for his comfort, and secondly, because there is no nice, clean, fresh water for him to lie in. So, if you will start with the belief that the pig is a cleanly animal, you will have gone a good way on the journey which ends in success in pig-raising.

We will begin by deciding never to buy a pig because he is cheap, except of course under exceptional circumstances. Such a pig as is here depicted—the wiry and alert old-fashioned razorback—is not the type to be recommended

even if she be received as a wedding present. She has far too many points. There are certain points about a pig just as there are about any other animal, by which his good or bad qualities may be gauged. What are the good points of a pig?



Neat in the head, which means a nose neither too long nor too short.

A nice, shapely, keen-looking face with bright, mild eyes, broad forehead, and a good-tempered appearance.

Ears, soft and pliable. When they fall a little to the front without absolutely being *lopped* the point is good.

Light neck and shoulders for the coarser parts of a side of bacon, and those which fetch the lowest price are the neck and shoulders, and the lighter those parts the better the side, and the higher price they will make.

Deep in the ribs.—Looking at this point from the bacon-curer's point of view, a pig that is deep and round in the ribs will of necessity produce a larger proportion of first-class bacon.

Thick in the loin.—A pig with heavy loin has capacity for food, together with good digestion, and strong constitution generally. The loin is high-priced and the weight of that should be kept up.

Stout in the thighs.—The hams are most important, and, in the case of pigs killed for the ham and middle (flitch) trade, the most valuable of all.

Long silky hair indicates strength of constitution as well as lean meat.

Such are the points which indicate a happy union between thriftiness and lean meat—a union which suits both the curer and the producer.

The object in breeding pigs is to raise such animals as will produce the meat required by the manufacturer. Consequently it is necessary that you should have a clear idea of the class of meat which will supply the requisite features.

In all parts of the world, and also in this State, the demand is only for lean, medium-sized bacon. By lean bacon is meant that a large amount of lean, streaky meat must predominate. To attain this end you must be especially careful as to the breed of pigs you start with.

Some people, especially in the southern States, prefer the Tamworth breed. This breed shows some angularity of formation rather than blockiness. It has a prominent backbone and well-developed vertebrae. It possesses all the requisites for a good dairy breed of swine. A decided improvement is to cross it with the Berkshire.

The pig to be most recommended, however, is the improved Berkshire. The medium Berkshire, properly fed, will, at seven months old, produce the best description of bacon for the market. If you do not keep a pure breed, let it be as nearly pure as possible. Take care that the boar is pure. The sows may have a touch of another strain without detriment. As to the weight of the proper marketable Berkshire at seven months, it should turn the scale at about 12 stone (168 lb.) dead weight. The live weight would be between 15 and 16 stone. Feeding properly is everything in the case of the bacon pig. Don't take the Irishman's plan to produce streaky bacon. He starved it one

day to produce a streak of lean meat, and crammed it the next day to lay on a streak of fat. Pigs fed steadily and regularly will give the most satisfactory results.

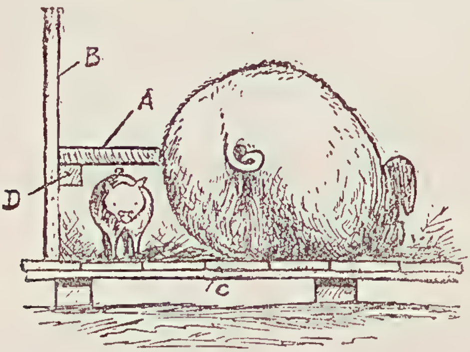
In starting your herd, remember to give the first consideration to the boar. Get a high-class sire from some well-known breeder. If you are careless about this, and start with some half-bred mongrel, it will take you years to work out the bad strain. It is the boar which gives shape, points, and quality to the herd. The sow furnishes the internal structure and the frame. In choosing a boar, always make a point, if possible, of looking at the herd and the quality and uniformity of the sows and their progeny. Choose a boar with plenty of hair, true markings, gentle disposition, uniform breadth across both shoulders and loins, with full hams, deep sides, and good length, consistent with size.

A young, well-developed boar may be used for stud purposes at nine months old.

In selecting the sows, choose them with such points as I have given you above; good, long and roomy, active and vigorous, with deep ribs and full hams, about half or three-quarters bred, sows that will eat readily and develop a big supply of milk. See that the sow has not less than twelve teats, for if she is well-mated she should throw not less than ten or twelve pigs at a litter twice a year.

The sow should not go to the boar until she is eight months old. Just about a week before she is going to farrow, put her in a nice, dry, clean pen with plenty of straw, and well-sheltered from bleak winds and rain. Let her have plenty of clean, fresh water, and don't forget to give her some charcoal. Feed her now as you intend to do after farrowing, because if you change the food afterwards you are apt to induce scouring in the young litter.

Pigs are very apt to crush the young ones against the sides of the pen when about to lie down. This is very simply guarded against. I stated this in my article on pigs and their management in the *Queensland Agricultural Journal*, and gave the illustration of the appliance which is here reproduced—



It is, as you see, merely a plank—a round rail will do—fastened to the sides of the pen, about 6 to 7 inches above the floor. The little pigs can get under this, and they are saved from being crushed. Use 2-inch by 8-inch plank, A, around the interior of the house, about 10 inches from the floor, C, the plank A being rendered more secure to the side, B, by the support D. The space provided under the plank, A, is sufficient for the young pigs to crawl under, and the sow cannot overlay them owing to the protecting plank projecting.

In about three weeks time, the little ones will begin to feed on something besides milk, so now is the time to wean them. Mix up a little pollard with milk and water in a shallow trough. They will soon learn to feed, and then you can let the sow out for a run on the grass, which will do her a great deal of good. You can go on doing this until they are six or seven weeks old, letting the sow have more liberty every day. Then you can dry off the sow, and in three or four days put her back to the boar.

The keystone of successful pork production lies in the treatment of the young pig.

Starving or pinching after weaning means little or no profit, but, on the other hand, generous and judicious feeding ensures success.

You have heard of pigs eating their young. The fault lies with the owner himself. No sow kept in a roomy, warm, dry, pen, and fed liberally on roots, wheat, plenty of skim milk, and a little linseed meal, will ever eat her young. It is improper feeding before and after farrowing, and the want of water to quench her thirst which drives her to this cannibal habit.

Pigs are the hardiest of all domestic animals. Indeed they have need to be hardy considering the shameful treatment and rough quarters they have to put up with, with some people who call themselves dairy farmers. Still pigs will die now and then a natural death. Suppose you find a pig with a hard, dry, feverish skin, standing about looking stupid, and objecting to feed. That pig is sick, and you must act promptly. Generally, the animal is constipated—*i.e.*, its bowels do not act properly. If that is the case, give a dose of Epsom salts in sweet milk. Separate it from the rest. If the pig is chilly, give it a good hot slop of milk with some cayenne pepper in it, to get up a perspiration. Take care that no cold draught blows on it then. Bran mashes are good for constipation.

Young pigs, which the mother has not accustomed to exercise, are liable to contract a disease called THUMPS, which is caused by the fat gathering round the blood-making machinery of the pig. This makes the blood flow slowly—the pigs get sluggish, and if not looked after, will soon die. The remedy is to lessen the food and drive them about the pen after the dam has gone out for a run.

SWINE FEVER, called in America "hog cholera," is a very dangerous, highly contagious disease, in which the lungs and alimentary tract are inflamed, causing death in from ten to thirty days. You cannot well recognise it in its early stages, yet the diseased animals may be transmitting it all the time to the healthy ones. You first notice a cough and a swelling of the glands of the groin. Then they become dull, go off their feed, have great thirst. Sometimes they stiffen and get red spots about the head, neck, and ears. The animal tries to bury itself in the straw, lies on its belly, the ears get very hot. Later on the tail hangs limp, the eyes become of a brick-red colour, it breathes hurriedly, the pulse is quick (a pig's pulse is felt on the inside of the thigh), the dung hard and black. Vomiting may next appear, and the fore legs may become weak. The snout is dry and covered with red spots, which also appear on other parts of the body. Then diarrhœa sets in, and death occurs in from eight to sixteen days. So far the only remedy has been to kill the affected pigs to prevent the spread of the disease. Eighty pigs were destroyed at Mackay. Pigs fed on offal are most liable to the disease. Every case should be at once reported to the Department of Agriculture, and care will then be taken to prevent the spread of the disease. Pigs are infested with several kinds of WORMS, which affect the bowels and bladder. Turpentine, linseed oil, spirits of camphor, and Epsom salts are all good remedies, but a specialist in pig diseases should, if possible, be consulted.

SCOURS or diarrhœa is a common ailment of young pigs. The trouble is caused by too much feverish, rich milk. Sometimes little pigs are born with scours. To prevent the ailment, feed the sow regularly, and, a day or two before she farrows, do not give her quite so much food as usual. Give her warm water the first twelve hours after farrowing, and the next twelve hours a thin bran mash. Give a teaspoonful of copperas to a sow with seven or eight pigs. Never feed a suckling sow on sour food, such as sour buttermilk, sour whey, &c.

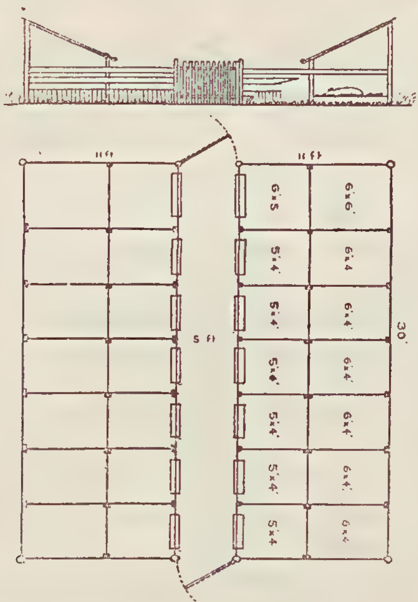
If the little pigs are a month old, a teaspoonful of castor oil with ten to fifteen drops of laudanum will often get rid of the irritating material which causes scours.

There is a GENERAL REMEDY and a very simple one, for a sick pig, given in *Hoard's Dairyman.* The cure-all is nothing more than fresh milk and turpentine. The writer says it is the best remedy he knows of for all the diseases pigs are heir to. For a young pig six weeks old, give a teaspoonful of turpentine in, say, half-a-pint of milk. If the pig is too far gone to drink, then administer it with a spoon. An older pig will seldom refuse new milk even when a tablespoonful of turpentine is given in a quart or more. Always keep turpentine on hand and, at the first sign of any sickness, administer it as recommended above.

Having now instructed you how to start your herd of pigs, how to make them increase and multiply, how to treat the mother and her litter, how to wean the little pigs, and how to cure their diseases, I will devote a little space to HOUSING AND FEEDING.

Without a suitable piggery, you cannot hope to make a success of swine-feeding, so I will just give you a few suggestions.

In the first place, your building *must be dry*—dry walls, dry beds, and, as far as practicable, dry floors. Dampness produces unthrifty, rheumatic pigs, and injudicious feeding will aggravate these evils. Then the pens should be reasonably warm and ventilated; lastly, they should admit the sun freely, at the same time leaving a shady spot for the pigs to avoid the hot sun. Some people build a piggery with a central passage and pens on both sides. My piggery was built on this plan. I give you a diagram of it, and it can be built very cheaply with materials which can be obtained from the bush—



The materials required are—

4 corner posts, 8 inches diameter.
32 intermediate posts, split, 3 by 8 inches.
40 rails, split.
100 slabs for back walls.
100 palings.
1,000 shingles.

These complete the walls and roof.

For the subdivisions you will require—

36 rails, split.
120 palings for the gangway.
100 slabs for raised sleeping places.
16 wooden troughs which you may make of hollow logs or of sawn timber.

The COST OF THE MATERIAL is small. The thirty-six posts can be cut and carted in your spare time, so we will not count them.

	£	s.	d.
76 rails	1	0	0
200 slabs	2	10	0
220 palings	0	10	0
1,000 shingles	1	0	0
Total	£5	0	0

The troughs you make yourself, so only the labour need count as in the case of the posts. Indeed, if you do all the work yourself, which every farmer should be able to do, the whole cost will be under £5, and your pigs will be comfortably housed. The raised sleeping place is absolutely necessary to cleanliness and comfort.

Now, lastly, as to FEEDING. We will take the brood sow. You can feed a compact brood sow till she is as pretty as a picture. Plenty of rich food will do that, because it will develop her fat, but fat and a high degree of fruitfulness or fecundity do not go together. Therefore avoid giving in excess all foods tending to produce fat. Do not stint the food, but let all foods be flesh-formers. Starchy food should be used very sparingly. The best classes of food for pig-feeding are cooked potatoes, milk, barley-meal, oatmeal, crushed oats, pollard, bran, and ground wheat. Barley-meal need only be scalded – not cooked. Let the brood sows have plenty of exercise and provide a grass run for them. Skim milk, if sour, should not be fed to them. In fact, skim milk alone is not a profitable food for any pig, as it takes from 20 lb. to 40 lb. of the milk to form 1 lb. of flesh. Peanuts are a capital muscle-forming food for growing animals —not for those which are intended for immediate killing. Lucerne, peas, rape, &c., are beneficial to the brood sow.

For the production of bacon, ground malting barley and boiled mangolds are excellent food. An experiment was made a couple of years ago (May, 1900) at the Queensland Agricultural College by the Principal, Mr. J. Mahon. He experimented with eight pigs from common bred sows by a Berkshire boar. They were twenty-two weeks old when the experiment was begun. Four pigs were placed in each of two pens. Those in the first pen were fed on as much boiled mangolds as they could consume together with kitchen swill. The second lot were fed on ground barley and boiled mangolds reduced to a thick slop. I need not give you all the details. The average daily feed of boiled mangolds was 17 lb. The average daily feed of barley and mangolds mixed was 9½ lb. The mangold-fed pigs consumed 28 lb. of food for an increase of 1 lb. in weight. The barley-fed animals consumed only 5¾ lb. for the same increase. Three shillings worth of mangolds produced 4s. 6d. worth of pork, whilst 19s. 6d. worth of barley gave £1 10s. 2¾d. worth of pork. Therefore, the gain by feeding barley to pigs was shown to be 1s. 5d. per bushel when barley is worth 2s. 6d. per bushel, and the feeding value of barley for pork production was 3s. 11d. per bushel when pork was worth 2¼d. per lb. live weight.

When I said that cooked potatoes were good pig-food, I should have advised mixing them with some other food, such as oats or barley, because potatoes tend to produce soft pork. Bonemeal and wood ashes should always be supplied to pigs. The effect of bonemeal and ashes is to save about 28 per cent. of the total amount of food required to produce 100 lb. of live weight. As for the little pigs just weaned, half-a-pint of new milk a day is sufficient; after a few days, let them have it twice a day, and later on a quart, together with (still later on) a little grain and meal.

Now, it is time to close this lesson. I have endeavoured to show you how to feed for profit, but bear in mind that all pig-breeders do not think in the same manner. There is a Latin proverb which means "Many men, many minds." That is, different people have different ideas. So do not think that I want you to accept what I have told you as being the only possible right way to breed and feed pigs for profit. You will, as you go on, pick up many valuable ideas from practical breeders, which may be quite opposed to what is here stated, and will yet be right.

Questions on Lesson 14.

1. What is the first thing to be considered when starting at pig-breeding?
2. What are the good points of a pig?
3. What does long silky hair on the pig denote?
4. What class of bacon and hams is most in demand in the meat trade?
5. Which breed of pigs is generally most suitable for this State?
6. In choosing the boar and the sows, what precautions should be taken?
7. At what age should the sow be bred?
8. How may young pigs be protected from being accidentally crushed by the mother?
9. When may the little pigs be weaned?
10. Why do some sows eat their young? How may this habit be prevented?
11. Name some diseases of pigs, and the remedies for them. What is a general remedy?
12. Describe the symptoms of Swine Fever.
13. How should pigs be housed? Draw a diagram of a suitable piggery.
14. State how you would feed—(*a*) the brood sow; (*b*) the bacon pig; (*c*) little pigs after weaning.
15. Which is the better food for the production of pork—Boiled Mangolds with kitchen swill, or Boiled Mangolds and crushed barley? What difference is there in the result of these feeds with respect to increase of weight of flesh by their use?

FARM FODDER—COCKY CHAFF.

Some time ago we advocated the use of "cocky chaff" as fodder for stock, and we were met with objections which, in the light of the present drought conditions, appear quite too absurd. Wheaten chaff is to-day much appreciated, and analysis has shown that as far as feeding value is concerned there is nothing to choose between the husk or cocky chaff and wheaten chaff. Of course, neither wheaten straw nor cocky chaff can compare with oaten straw in the way of heat and fat production. The latter contains 25 per cent. more nutriment, and is nearly four times as rich in digestible flesh-formers. Still, cocky chaff is not at all to be despised at a time when we hear that cattle are being fed on sawdust and molasses, prickly pear, bottle-tree, ironbark leaves, &c. There is one thing about cocky chaff worth noting. It can be stacked—that is, piled in heaps on the field and covered with a rough thatch, and remain perfectly dry, for rain will scarcely penetrate even an unthatched heap. Now, as to the relative cost of wheaten chaff and husk chaff. Both are of equal value, but the former is much more expensive to prepare. The wheaten straw requires to be cut, bound, threshed, and chaffed, whereas the cocky chaff requires no such manipulation once it has passed through the thresher. And here we may note that by the use of the harvester the chaff is not saved. It is scattered over the field and lost, but when wheat is low in price it is necessary to use the harvester. Can anything be done to enable the farmer to use the harvester and yet save the chaff? According to the *Sydney Mail* we are on the eve of such an improvement. That journal says:—"It is surely unfair to condemn the combined

harvester simply because it does not save the chaff. This machine has been perfected by many years of application on the part of clever inventors, and has come into use through the enterprise of manufacturers who have cheapened production greatly by introducing machines and implements most suitable to Australian agricultural conditions. In some respects it does better work than the stripper, because it makes a more reliable sample than is turned out by the class of labourer who turns a winnower handle for a minimum wage fixed by a paternal Government. Moreover, it provides the cheapest harvesting process that has come into general use in these States, and must, therefore, be regarded as a powerful agent in reducing the cost of producing wheat. In this State, where the Government, by entering into competition with the private employer of labour, has attracted all reliable labour from the farms, the farmers are absolutely driven by circumstances to adopt such machines as the harvester. Therefore, if the harvester continued to waste the cocky chaff it is certain that it would still pay to use the machine. But there is no necessity to continue wasting the chaff. Already chaff carriers have been tried, and with some measure of success. There is, however, room for great improvement, and now that the matter is compelling attention we may expect to see a very complete device attached to the harvester within a brief period. In addition to saving the chaff, the carrier would serve to prevent the spreading of 'wild oats' and other weeds about the wheat paddocks. In arranging further harvester trials it would be well if the promoters made provision to specially recognise the chaff carrier in the scale of points, and thus stimulate the inventive genius of the manufacturers."

LIME AS A SOIL IMPROVER.

By G. B. BROOKS, Manager, State Farm, Biggenden.

The failure of a soil to give remunerative returns may be due to various causes, such as absence of soluble plant food, improper cultivation, or the unfavourable mechanical texture. The latter condition is a very important one, for, although the soil may be rich in plant constituents, it is nevertheless imperative that, in order to secure the best results, it must be brought into a state most favourable for the crop to be grown. This means that the mechanical condition must be such as to allow the plant roots to ramify unhindered through every inch of soil in their search after food.

There are many soils, especially those of a sticky, clayey nature, which it is not always an easy matter to get into such a condition. In a dry time they get hard, something after the consistency of a brick, and are very liable to crack. In wet weather they get boggy, and often remain in this condition for some considerable time. When in this state, to cultivate or even keep down the weeds is no easy matter, consequently they stand at a great disadvantage compared with soils of a more friable nature. Another feature of many soils is that they are of a cold, sour nature, and, unless thoroughly cultivated and exposed to the sweetening influence of the atmosphere, for some considerable time poor returns are sure to result.

In the older countries, when dealing with refractory soils, farmers often find it advantageous to bring to their assistance what may be termed special soil improvers. Of these there are two that stand out pre-eminent—viz., farmyard manure and lime. Both have their special uses and advantages, but it is to the part the latter plays in relation to soil fertility that I would specially draw attention.

The practice of using lime in connection with agriculture is a very old one, but I believe that in Queensland the benefits derived from liming are yet but dimly recognised and the practice seldom adopted. The scientific name for lime is calcium. The usual way to obtain lime is to burn limestone (which is carbonate of lime) for about two days in wide-mouthed kilns. The heat expels water and carbonic acid from the limestone, converting it into calcium oxide, or, as it is

more commonly termed, quicklime. This expulsion is worth remembering, as on the first opportunity lime takes in the water and carbonic acid driven out during the burning process, and gives out the heat received in the kiln. The effect this has on the soil will be seen later on. Other carbonates of lime are found besides limestone, such as chalk (called whiting when ground), coral, marble, oyster-shells, and shell sand. Lime derived from the latter generally contains too much sand to be of any great value for agricultural purposes, unless procured at a very cheap rate.

Such lime is a hard, heavy substance, greedy of both water and carbonic acid. It absorbs large quantities of water without becoming wet, and crackles and hisses and behaves in a life-like manner; hence the name of quicklime.

Slaked lime is a powerful alkaline substance used in many ways. Mixed with sand and water, it forms the mortar used for building purposes.

In agriculture lime is generally put on the land at the rate of 1 to 5 tons per acre. Finely pounded lime unslaked, is sometimes applied, and in this form produces more powerful effects. Lime ought to be harrowed into the soil immediately it is applied, so as to cover it up from the air, from which it would absorb carbonic acid gas and speedily be converted into carbonate of lime. When covered up by the soil it takes the carbonic acid from the decaying vegetable matter or humus, hastening the process of decay, and thus liberating hydrogen and nitrogen. This is rather important, as when the liberation of both is simultaneous and slowly effected they unite in proportion of 3 of hydrogen to 1 of nitrogen, forming ammonia—a very valuable plant fertiliser. Unfortunately, there are conditions under which this formation is not always certain to result, such as lack of moisture, so that lime may sometimes destroy the vegetable matter in the soil to no good purpose.

Some generations ago farmers in the old country discovered that great crops of grain could be grown by the aid of lime, and they used it unsparingly, even although they had in many instances to convey it from great distances. For a time they succeeded in producing heavy crops, because the soil was full of manure and humus, but by and by, they found that lime had ceased to work miracles, and, though some people tried to make it do what it once had done by doubling the quantity applied, it came to be admitted that lime had not the beneficial effect it once had. Later on it was found out that, beyond supplying the small quantity of lime necessary for the growth of plants in soils where it naturally was deficient, the lime had been decomposing all the vegetable matter—the only store of nitrogen in the soil—so that it had now nothing in it but mineral food, viz., lime, phosphoric acid, and potash, &c. Though the lime did not supply any nitrogen to the soil, yet it produced, for every ton applied, much the same effect as the application of so many hundredweights of nitrate of soda or sulphate of ammonia. The difference in the condition of the soil after a crop grown by the application of lime and one grown by the application of nitrate of soda or sulphate of ammonia was, however, very great. In the one case the soil had to grow a heavy crop at its own expense; on the other the crop was grown by aid of the plant food in the manure supplied. This action is, no doubt, what has given rise to the old saying that "lime enriches the father, but impoverishes the son." The application of large doses of lime to light sandy soil, or to soil that has become exhausted through continuous cropping without backing it up with fertilisers, is a great mistake. It is something like applying a whip to a done-up horse—trying to take out what is really not there. An old couplet says that "Lime and lime without manure will make both farm and farmer poor."

In applying lime to the soil, care must be exercised as to the nature of the soil on which the application is to be made. I have known of some cases where as much as 10 tons per acre was applied without any bad result, and others where half that amount practically ruined the soil for certain crops, such as oats and barleys. The only rational cure for land that has been what is termed burned with lime is to supply large quantities of farmyard or nitrogenous manure.

If lime is to be applied to the soil in excess of what is actually required as a plant food, care must be taken that it has got something to work upon, either a strong clay or soil over-loaded with humus. It can be safely used to advantage on newly drained swampy land, and also on newly cleared forest land of the "black soil flat" type. Its effect on the abovenamed class of soils is to render them more porous and open, removing in a large degree the adhesive sticky nature when wet, and making them more friable when dry. This condition being brought about, thorough cultivation can then be practised, ultimately resulting in the land being brought from a low to a high state of fertility.

Its correction for sour lands is well known. Being strongly alkaline, it neutralises acidity, thus ridding soils of deleterious matter harmful to plant life.

Lime is also a great assistance to drainage—in fact, I have seen cases where lime in itself proved a means of drainage. This was on a field of stiff clay, on the surface of which water used to lie for some considerable time after heavy rains. Plots in various parts of this field were limed, and on those the effect was most marked, for after rains no water was seen to lie on their surface, but on the unlimed parts the water remained as before. Another highly important function of lime is the favouring of the development of nitrification in the soil. Nitrification is an action of micro-organisms in the soil which act upon nitrogenous matters, converting them into nitric acid—a very valuable plant food. A certain amount of alkalinety is required for their development, and the presence of carbonate of lime in the soil furnishes this necessity.

Lime and phosphate powders containing caustic lime may be safely mixed with all potash manures, nitrate of soda, nitrate of potash, bones in any form (except dissolved bones), mineral phosphatic manures (except superphosphate). Neither caustic, slaked lime, nor phosphatic slags, which contain caustic lime, should be mixed with sulphate of ammonia, guano, or any animal or vegetable matters yielding ammonia, because the lime would take up the sulphuric acid of sulphate of ammonia and the carbonic acid of the decaying animal and vegetable matter, setting free the ammonia which these things contain.

As to slaking and mode of application, the common practice is to spread the lime in small heaps and cover up with soil. Providing there is a like moisture in the soil, the lime will in a few days be sufficiently slaked to allow of its being spread with a shovel. There is, however, a little risk attached to this method, for, should heavy rains ensue before spreading, the lime will be converted into a paste, difficult to distribute, and, moreover, less powerful in its effects. Another and perhaps safer way is to tip in a long heap adjacent to water and slake, then distribute by means of a dray, one hand leading the horse at a slow pace, another standing on the dray spreading with shovel. By working in this fashion—against the breeze—very little discomfort is felt. To keep the fine dust from lodging on the horse's skin, a cover of some sort should be put on—say a couple of bags under the harness.

Numbers of experiments are being carried out at the Biggenden State Farm, with a view to testing its effects on the soil, which varies from dark basaltic to sticky cement. Owing to the drought, no complete data are yet available, but its beneficial effect on a row of rosellas is easily to be seen. Of a row of twenty plants only half were limed, the application being at a rate of 2 tons per acre. In the no-lime lot, four out of the ten have died owing to the dry weather, and other two look sick. Amongst those limed, only one shows signs of dying, all the others looking remarkably healthy. At the time of writing only the first picking of fruit has been taken; the returns being, respectively —unlimed, 8 lb.; limed, 22 lb.

The land on which the rosellas are being grown is of a very stiff nature. On removing the loose cultivated soil from around the dead bushes, cracks were found, which, no doubt, severed the roots, thus causing death to the plant. The action of lime on this soil has undoubtedly been to keep it more loose and friable, preventing cracking, and thus better able to conserve the moisture.

AN OASIS IN THE WILDERNESS

There is a township on the Central Railway line, 361 miles from Rockhampton, called Barcaldine. In this portion of the State there are several bores, from one of which several farms are irrigated and the township itself is plentifully supplied with water; consequently most of the houses have pretty gardens, and vegetables are plentiful and cheap.

Twelve miles from Barcaldine is a property of 1,280 acres of now so-called desert country owned by Mr. W. Hannay. This gentleman has a private bore from which he irrigates a large area of land. The name of the property is Geera. Here there are 150 acres of wheat which, early in August last, was 4 inches over ground and looking very healthy, giving promise of a good crop. This is all irrigated by a main drain half-a-mile long and 4 or 5 feet deep, from which lateral drains branch off 1 chain apart. The bore water is run into these till the soil is thoroughly saturated. When watered, this soil, which, when dry, looks like pure sand, changes its appearance to that of a rich loam. Couch grass springs up spontaneously. At the time of our informant's visit, Geera was the only green spot in the dried-up, desert-looking country between Alpha and Longreach.

Mr. Hannay has filled a lagoon covering 54 acres from the bore, and proposes to put down a second bore and to irrigate a much larger area of land. This goes to show that with irrigation, large areas of land can be successfully cultivated, the drought notwithstanding.

QUEENSLAND NATIONAL ASSOCIATION'S SHOW.

EXHIBITS.

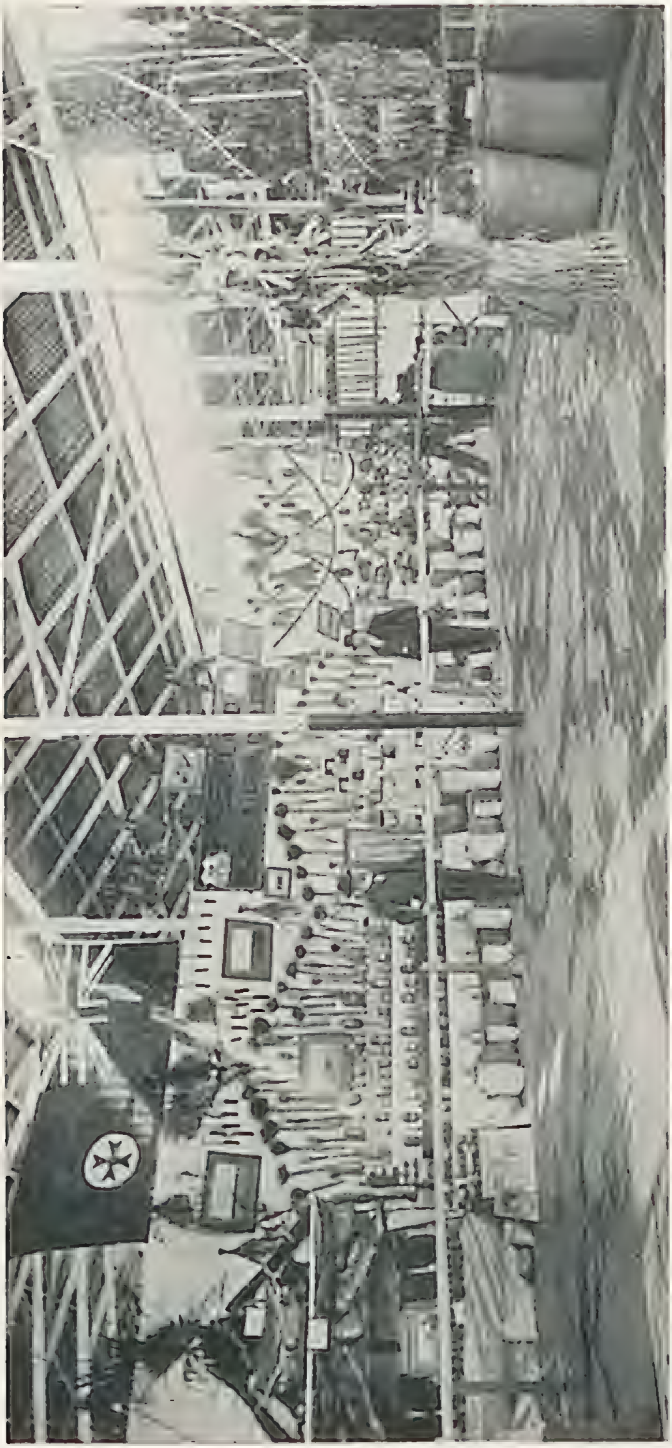
Owing to the long-continued and disheartening drought, only four districts competed at the Bowen Park Exhibition, viz.:—Moreton, Logan, Ipswich, and Warwick. These, however, made such an excellent display of the most varied products—agricultural, mineral, and mechanical, of forest and scrub timbers, and of manufactured goods—that a stranger would, on paying the courts a visit, have hesitated to believe that nearly twelve months had elapsed since the last useful rains on the coast and a far longer period more inland. The various Queensland journals have so fully and ably described the exhibits that there is no need here to enumerate them. Suffice it to say that the districts represented deserve the greatest credit for the energy they threw into the work of collecting exhibits and for so well upholding the credit of the agricultural districts of Queensland. The judging was by points, and the probable result was not announced until the work was completed. The awards were as follow:—

Moreton	56 points
Ipswich	54 ,,
Warwick	50 ,,
Logan	47 ,,

The actual points awarded to each district in each section were thus scheduled by the judges:—

—	Maximum.	Moreton.	Ipswich.	Warwick.	Logan.
Dairy produce	10	6	7	6	4
Foods (fresh and preserved)	10	6	8	4	6
Fruits, vegetables, roots	10	9	3	3	6
Grains and their products	10	3	4	8	4
Manufactures...	10	6	9	4	7
Minerals and building materials	5	3	4	3	1
Tropical products	10	6	3	0	6
Wine and other drinks	5	4	3	2	1
Tobacco	5	0	0	3	0
Hay, chaff, grasses	10	5	4	5	5
Wool, scoured, greasy	10	4	6	10	4
School exhibits	5	4	3	2	3
Totals	100	56	54	50	47

Plate XIV.



THE QUEENSLAND AGRICULTURAL COLLEGE EXHIBITS AT BOWEN PARK, AUGUST, 1902.

STATE FARM EXHIBITS.

These comprised exhibits from Westbrook and Hermitage State Farms, and from the Queensland Agricultural College. All three were most tastefully arrayed, and formed a very conspicuous feature in the building. How the fine vegetables (field crops), the magnificent maize and other products of the farms, were produced without irrigation is a wonder to the uninitiated. Messrs. Ross

Westbrook and Hermitage State Farms Exhibits at Bowen Park, August, 1902.

and Quodling, the respective managers of the two State farms, must have made a study of the arid farming in Utah, U.S.A., where heavy crops of cereals and other products are obtained from farms beyond the irrigation areas, and where the rainfall rarely exceeds 12 inches, and in some years falls as low as 8 inches per annum. The secret lies in deep soil, and constant cultivation resulting in small evaporation of the moisture contained below.

The Agricultural College section was a perfect work of art in the way of decoration by means of screens of grasses, and numerous vessels containing many varieties of seeds. The vegetable display was marvellous, but at the College there is a system of irrigation in the area devoted to raising vegetables which has proved of immense value to the horticulturists of the institution. Of course, hams, bacon, butter, and cheese prepared by the students were not wanting. Generally the exhibit went to show the class of instruction given at the College, and gave evidence that the students are profiting greatly by the lesson, both theoretical and practical.

AMOUNT OF WATER NEEDED FOR IRRIGATION.*

The amount of water needed for irrigation varies within wide limits, being affected by the climate, weather, kind of soil, variety of crop, manner of application of the water, and by the character of cultivation which the field receives subsequent to irrigation.

* Extract from "Irrigation in Humid Climates" by F. H. King. Farmers' Bulletin No. 46, U. S. Department of Agriculture.

Let us first consider the amount needed for a single watering. This must be determined by the amount of water the soil contains at the time it is to be irrigated, and by the amount it should contain in order that plants may do their work to the best advantage.

The maximum capacity of upland field soils for water ranges from about 18 per cent. of their dry weight for the light sandy types to about 30 per cent. for the heavy clayey varieties, while the amounts of water these soils should contain in order that plants may thrive in them best is from 12 to 14 per cent. for the former and from 18 to 20 per cent. for the latter. The growth of plants will be seriously checked in sandy soils when the water content falls below 8 per cent., and in heavy, clayey types when it falls below 14 per cent. of the dry weight of the soil.

The dry weight of a light sandy soil and subsoil will average about 105 lb. per cubic foot, and the heavy, clayey type about 80 lb. per cubic foot. Hence the maximum amount of water per cubic foot of soil would be about 24 lb. for the clay and 18·9 lb. for the sand. This being true, 4·6 inches of water on the level would completely saturate the surface foot of heavy clay soil, were it entirely dry to begin with, while 3·6 inches would place the sandy soil in a similar condition.

But since water should be applied as soon as the water content of the sandy soil falls to 8 per cent. and that of the clayey soil to 14 per cent., it follows that under these conditions 10·5 lb. of water, or 2 inches, is the maximum amount which would be needed to fill the surface foot of sandy soil and 12·8 lb., or 2·46 inches, is enough to fill the surface foot of clay soil.

If we consider the second foot of soil to have been dried out to a corresponding extent, and that it is desirable to saturate this with water also, then the amounts just stated would need to be doubled, 4 inches being demanded for the sandy soil and 4·92 inches for the clayey soil. It is quite certain, however, that such an application of water to a field at one time would result in the percolation of a considerable amount of this water below the depth of root action, and hence in a considerable loss of it unless a large crop were growing upon the land at the time. It appears, therefore, that the amounts of water which may be applied to a field at one time will lie between 2 and 5 inches in depth over its whole surface.

How often this watering may need to be repeated, it is not possible to state in anything like definite terms, but practical experience shows that as a rough average the intervals between watering where maximum yields are sought can not much exceed seven to fourteen days, the time being shortest when the crop is making its most vigorous growth.

In experiments at the Wisconsin Station during 1895, corn was irrigated once about every seven to nine days, applying at each time 4·43 inches of water. The corn, however, was planted very thickly upon the ground, the rows being only 30 inches apart and the hills 15 inches apart in the row, with from two to five stalks in each hill. The first irrigation was given 26th June and the last 15th August, the total amount of water applied being 26·6 inches. The yield produced was 11,125 lb. of water-free substance per acre.

In the case of the water meadows of Europe very little attention is paid to the natural rainfall, the irrigation waters being applied whenever it is possible to do so, and whatever rains fall are counted as so much additional gain. It is true, however, that on most lands with crops other than grass, attention would have to be given to the natural rainfall in the application of water by irrigation, but oversaturation of the soil and a positive waste of water should occur.

If it is regarded that ample irrigation has been provided when 2 inches of water is supplied every ten days as a minimum, and 4 inches as a maximum, then, to meet this demand, there would be required for one acre a continuous flow of water at the rate of 0·5042 cubic foot, or 3·77 gallons per minute for

2 inches, and 1·008 cubic feet, or 7·54 gallons per minute for 4 inches. An area of 10 acres would require a rate of flow ten times as rapid, or 5·04 cubic feet per minute for the minimum, and 10·08 for the maximum.

These amounts of water expressed in cubic feet and in gallons are as follows :—

	Cubic feet.		Gallons.
For 1 acre 2 inches deep	7,260	=	54,310
For 1 acre 4 inches deep	14,520	=	108,620
For 10 acres 2 inches deep ...	72,600	=	543,100
For 10 acres 4 inches deep ...	145,200	=	1,086,200

If these amounts of water are stored in circular reservoirs with vertical sides, and 3 feet deep, their diameters will be respectively, 55·5 feet, 78·6 feet, 175·5 feet, and 248·5 feet.

SUBSOIL *V.* SURFACE WATERING.

Mr. R. Martin, Hobart House, Cawdor, writes as follows on the subject of irrigation. He has practically tested the two methods of surface watering and subsoil watering by means of bottles sunk neck-down in the soil. For three years he has tried various kinds of watering during dry weather, and he obtained the best results from subsoil watering and top-dressing with farmyard or pig manure.

It stands to reason that when the soil moisture below the surface is exhausted, as is the case in times of drought, something more is needed than merely wetting the surface of the soil with a hose watering, which makes it bake and crack in the heat of the sun, and which, in almost all cases, does more harm than good. The case is different with subsoil watering, as the plant gets the benefit of the water from below by capillary attraction. In the former case, the water evaporates quickly, and affords but slight nourishment to the plant, unless the subsoil happens to be moist, when the combination of surface and subsoil water acts beneficially. Mr. Martin here gives one or two simple methods of watering which he adopts. Suppose a tree to be watered. He digs a hole about 1 foot from the butt, 1 foot in diameter, and 1½ feet deep. This is filled with refuse and manure, and water is poured in to saturate it. This gives ample moisture gradually applied in a dry season. Cabbages or cauliflowers he treats in the same way, digging a round hole with an iron spud bar and putting on a top-dressing of horse manure all along the row. This is then watered from a watering can through the rose. For melons or cucumbers a bottle or large syrup can is used, the latter with small holes punched in the bottom. These are sunk in the soil level with the surface near the root of the vines. Beds of plants sown in drills can be treated in the same manner with good results when they are well above the ground. At the time of sowing the seeds, a top-dressing of horse-manure sifted onto the bed to a depth of about a quarter of an inch will keep the soil from encrusting after watering. This will prevent the seed from being destroyed by the heat of the sun when germinating. The seedsmen often are blamed for selling bad seed when the failure is due to the carelessness of the farmer in sowing.

Watering requires to be done with judgment in different classes of soil. A stiff clay subsoil does not require nearly so much water as a soil with a loose, gravelly bottom. In the former the moisture will rise ; in the latter it will sink down, and naturally, in this case, a larger supply will be needed. In subsoil watering, hard mineral water can be used to a certain extent, whilst it could not be used with safety for surface watering, as it would probably injure the plants. After all, however, there is no artificial watering which can compare with the natural rain, but, without this, artificial watering must be resorted to if the plants are to make any growth.

LAMBS FOR THE LONDON MARKET.

When, in the course of time, and with the advent of good seasons, the farmers will generally take to rearing sheep on the farms, and grazing farmers begin to rear lambs for export, they will do well to remember what the London experts have to say about the points necessary to be observed in shipping lambs for the London market. The *Pastoralists' Review* writes on this subject:—

By the steamer "Maori King," which left Sydney during last year, there was shipped to London, through Messrs. Birt and Co., under the direction of the New South Wales Minister for Mines and Agriculture, a parcel of 125 lambs and sixteen tegs from the Bathurst Experimental Farm.

The lambs were from four and a-half to five and a-half months old, and the tegs from seven and a-half to eight and a-half months, and were composed of first and second crosses. The first crosses were by Shropshire, Southdown, Border Leicester, Lincoln, Romney Marsh, Dorset Horn, and Cheviot ewes.

The object of the shipment was to get expert opinion and advice as to the points necessary to be observed in shipping lambs to the London market.

The following are the more important points with respect to which directions are given and insisted upon by the experts:—

1. If top prices are to be obtained, the lambs must be milk lambs.

2. It is absolutely necessary for the London market that they be full of condition, well covered, and prime fat when frozen.

3. They should be closely graded, and even, as a lot, in quality and weight.

4. The minimum weight is fixed as low as 26 lb., but only if the lamb is thoroughly well covered and of prime quality.

5. The maximum weight is fixed at 42 lb., over that weight being classed as a "teg" at a reduction of ¼d. to ½d. per lb.

With regard to the shipment of first crosses, the decision of the experts is that the "get" of the Southdown ram and Merino ewe, and Leicester ram and Merino ewe, are the best.

With reference to the second cross lambs, the experts specially advocate this cross, and, taking the ewes as a criterion, class all those in the consignment as prime quality, with the exception of the Lincoln and Dorset Horn, which they term fair. As regards the order in which the second cross stand, the experts put those by the Southdown ram-English Leicester ewe as first, English Leicester ram-Cheviot ewe second, and Shropshire ram-Border Leicester ewe fourth.

Another important question asked of the experts was, whether lambs which have missed being ready as "milk" lambs should be fully fattened and sold as "tegs" from seven to twelve months old, and they strongly recommend that this course should be adopted. They advise making them prime, and sending them as "tegs" from 42 lb. to 50 lb., the difference in price in favour of "tegs" of this weight and prime full-weight sheep would be from ¼d. to ½d. per lb.

PLOUGHING SEVENTY YEARS AGO.

Probably no colonist of Queensland hailing from the old country can recollect the "Breast plough," which we here reproduce from an English exchange, the *Mark Lane Express.* The new generation of ploughmen in this State will doubtless wonder that men could be found with the stamina, the physique, and the indifference to slavish labour, which enabled them to toil with such an implement during a whole ploughing season. The journal in question says:—"The picture we show here represents the manner of using a very primitive implement. The 'breast plough,' as it is called on the Cotswolds, resembles an immense shovel with a share turned up on one edge, and is worked in three successive movements: First, a thrust in from the breast; next, the cross-bar

Plate XV.

The Breast Plough in the Cotswolds.

is dropped down to the thighs, which are protected by wooden guards called 'bitters' or 'betters' (*i.e.*, probably 'beaters'), from which a further push is given; finally, the clod gathered on the blade is turned over with a quick movement to the right. The owner of the plough, now over eighty years of age, remembers as a familiar sight, in his boyhood, twenty men ploughing abreast in one field. Hardly anyone at work to-day can remember to have seen, much less known how to use one. There is no doubt that the labour necessary is very severe."

MAIZE IN THE NORTH.

We should have written "Maize in the Far North." It is surprising that there are still people in the South who hold the belief that maize cannot be produced commercially north of Rockhampton. In these days of quick and cheap travel such an idea should long since have been exploded. We, ourselves, have seen splendid crops of maize grown in the great Northern scrub lands near Herberton. Now we learn from the *Ingham Planter*, a live journal published at Ingham, which always has a good and true word to say for the North, that maize, for the first time, has been exported from the Herbert River district. We take the following from the latest issue of that journal, and it bears out exactly what we ourselves have seen in that part of the State:—

"It is matter of common knowledge that during the drought, the Southern maize crops have practically failed, and it follows that if the North can come to the front as a maize-producing division of the State the pockets of farmers in the future may be very considerably improved. During 1901 the western portion of the Northern division had the heaviest yield of maize—38·15 bushels to the acre—the eastern portion averaging 33·33 bushels per acre, slightly under the average of the previous year; whilst, together, the whole Northern division returned the satisfactory average of 35·35 bushels. This yield, taken in conjunction with the high prices ruling for the article, should have given farmers a good return for their labour. Hitherto the Southern division of the State has been mainly looked to for maize, but the drought has made certain revelations which go to show that there is good reason why this and other Northern districts should come fairly prominently to the front as maize-producing centres. As to what kind of maize should be sown may be a matter of opinion, and in this connection a Mulgrave experiment may be worth noting.

"Over a year ago, according to the secretary of the Queensland Acclimatisation Society, it was suggested to him by Mr. John Stennett, of Elliott Bros., that he should import from Jamaica some seed of a variety of maize that was growing there; he thought this maize would be suitable for growing in our Northern districts where the ordinary maize did not do well—not that it did not grow well, but being of a soft nature it did not keep well in the damp climate of the North, and was, moreover, very subject to attacks from the weevil, whilst the Jamaica variety, by reason of its containing a larger proportion of gluten, was hard, and was found to stand the climate well. This suggestion was carried out, and some of the seed was distributed. One result is shown in a letter from Mr. S. W. David, of the Mulgrave (and known to many Ingham residents), to the secretary of the society referred to, and from which we extract the following:—'I am sending you a small sample of corn grown from the corn given me by your overseer when up here. I planted all the seed in my garden, and the resulting crop I gave to two of four farmers, who planted it on their farms. The sample I am sending you is not a picked one, as the farmers had saved the best for seed. They are highly pleased with the corn, and are going to plant a large area with it. The cobs were nice and clean, and free from all disease; grain hard and even. An exhibit of this corn will be most likely sent to your Brisbane show. It seems particularly suited to this climate.' It appears that two crops of the maize in question were grown in ten months, as only that time had elapsed from the distribution of the seed and Mr. David's

letter announcing the result of his experiment. It is of course not an unusual thing to have two crops in that time, but the fact is worth noting as showing that no time was lost over testing the value of the new seed. With a good-keeping maize, it should pay our sugar-planters to grow it for their own use rather than depend upon others, especially when sugar is low in price and maize is high."

We (*Q.A.J.*) have seen land in this Northern portion of the State on which maize, sweet potatoes, cotton, potatoes, oats, wheat, and barley can be grown as well as in the South. The climate is akin to that of the South, owing to the height above sea-level. If these lands were only occupied by farmers instead of lying idle, they would produce all the maize and other agricultural produce required by the North.

BREEDERS' TABLE FOR NOVEMBER, 1902—30 Days.

(From the *Live Stock Journal* Almanac.)

Day o Month.	Name of Animal, Hen, &c.	Date on which an Animal served or an Egg set on any day of the present Month is due to give Birth or Hatch.										Remarks.
		Mare, 48 weeks.	Cow, 40 weeks.	Ewe and Goat, 21 weeks.	Sow, 16 weeks.	Bitch, 9 weeks.	Goose and Rabbit 30 days.	Turkey, Duck, and Peafowl, 28 days.	Fowl, 21 days.	Pigeon, 18 days from last egg.	Canary, 13 days from steady sitting.	
1	...	Oct. 2	Aug. 8	Mar. 29	Feb. 20	Jan. 2	Dec. 1	Nov. 29	Nov. 22	Nov. 19	Nov. 14	
2	...	3	9	30	21	3	2	30	23	20	15	
3	...	4	10	31	22	4	3	Dec. 1	24	21	16	
4	...	5	11	Apr. 1	23	5	4	2	25	22	17	
5	...	6	12	2	24	6	5	3	26	23	18	
6	...	7	13	3	25	7	6	4	27	24	19	
7	...	8	14	4	26	8	7	5	28	25	20	
8	...	9	15	5	27	9	8	6	29	26	21	
9	...	10	16	6	28	10	9	7	30	27	22	
10	...	11	17	7	Mar. 1	11	10	8	Dec. 1	28	23	
11	...	12	18	8	2	12	11	9	2	29	24	
12	...	13	19	9	3	13	12	10	3	30	25	
13	...	14	20	10	4	14	13	11	4	Dec. 1	26	
14	...	15	21	11	5	15	14	12	5	2	27	
15	...	16	22	12	6	16	15	13	6	3	28	
16	...	17	23	13	7	17	16	14	7	4	29	
17	...	18	24	14	8	18	17	15	8	5	30	
18	...	19	25	15	9	19	18	16	9	6	Dec. 1	
19	...	20	26	16	10	20	19	17	10	7	2	
20	...	21	27	17	11	21	20	18	11	8	3	
21	...	22	28	18	12	22	21	19	12	9	4	
22	...	23	29	19	13	23	22	20	13	10	5	
23	...	24	30	20	14	24	23	21	14	11	6	
24	...	25	31	21	15	25	24	22	15	12	7	
25	...	26	Sept. 1	22	16	26	25	23	16	13	8	
26	...	27	2	23	17	27	26	24	17	14	9	
27	...	28	3	24	18	28	27	25	18	15	10	
28	...	29	4	25	19	29	28	26	19	16	11	
29	...	30	5	26	20	30	29	27	20	17	12	
30	...	31	6	27	21	31	30	28	21	18	13	

BREEDERS' TABLE FOR DECEMBER, 1902—31 Days.

(From the *Live Stock Journal* Almanac.)

Day of Month.	Name of Animal, Hen, &c.	Mare, 48 weeks.	Cow, 40 weeks.	Ewe and Goat, 21 weeks.	Sow, 16 weeks.	Bitch, 9 weeks.	Goose and Rabbit 30 days.	Turkey, Duck, and Peafowl, 28 days.	Fowl, 21 days.	Pigeon, 18 days from last egg.	Canary, 13 days from steady sitting.	Remarks.
		Date on which an Animal served or an Egg set on any day of the present Month is due to give Birth or Hatch.										
1	...	Nov. 1	Sept. 7	April 28	Mar. 22	Feb. 1	Dec. 31	Dec. 29	Dec. 22	Dec. 19	Dec. 14	
2	...	2	8	29	23	2	Jan. 1	30	23	20	15	
3	...	3	9	30	24	3	2	31	24	21	16	
4	...	4	10	May 1	25	4	3	Jan. 1	25	22	17	
5	...	5	11	2	26	5	4	2	26	23	18	
6	...	6	12	3	27	6	5	3	27	24	19	
7	...	7	13	4	28	7	6	4	28	25	20	
8	...	8	14	5	29	8	7	5	29	26	21	
9	..	9	15	6	30	9	8	6	30	27	22	
10	...	10	16	7	31	10	9	7	31	28	23	
11	...	11	17	8	April 1	11	10	8	Jan. 1	29	24	
12	...	12	18	9	2	12	11	9	2	30	25	
13	...	13	19	10	3	13	12	10	3	31	26	
14	...	14	20	11	4	14	13	11	4	Jan. 1	27	
15	...	15	21	12	5	15	14	12	5	2	28	
16	...	16	22	13	6	16	15	13	6	3	29	
17	...	17	23	14	7	17	16	14	7	4	30	
18	...	18	24	15	8	18	17	15	8	5	31	
19	...	19	25	16	9	19	18	16	9	6	Jan. 1	
20	...	20	26	17	10	20	19	17	10	7	2	
21	...	21	27	18	11	21	20	18	11	8	3	
22	...	22	28	19	12	22	21	19	12	9	4	
23	...	23	29	20	13	23	22	20	13	10	5	
24	...	24	30	21	14	24	23	21	14	11	6	
25	...	25	Oct. 1	22	15	25	24	22	15	12	7	
26	...	26	2	23	16	26	25	23	16	13	8	
27	...	27	3	24	17	27	26	24	17	14	9	
28	...	28	4	25	18	28	27	25	18	15	10	
29	...	29	5	26	19	Mar. 1	28	26	19	16	11	
30	...	30	6	27	20	2	29	27	20	17	12	
31	...	Dec. 1	7	28	21	3	30	28	21	18	13	

ORGANISED CO-OPERATION FOR QUEENSLAND FARMERS.

By FRED. WM. PEEK.

At the late show of the Bundaberg Agricultural Society, His Excellency Sir Herbert Chermside, Governor of Queensland, pointed out the great benefits to be derived from organised effort, particularly alluding to the good work accomplished by the co-operative societies of Northern Italy and Denmark, and especially to the organised efforts put forward in Ireland to better the condition of the farmers and producers, giving great praise to the Hon. Horace Plunkett, the author of "Help for Self Help in Ireland"; and as the pages of this *Journal* have time and again published editorial articles, as well as articles by myself and others, upon this important subject, it may be of interest to again

bring this matter forward at the present juncture, when the necessities of the hour and the troubles our farmers have to face call more loudly for united action to alleviate the many disabilities that are common to all. In a recent tour through Southern Queensland I have had the opportunity of visiting a large number of districts, and have had the pleasure of not only meeting with and addressing a number of societies, but also have rubbed shoulders with the men on the land by visiting their farms and having a little plain talk to practical men; and I must say, in all honesty, that every credit should be given to those farmers who have faced the present difficulties and unfavourable season with true British pluck and courage, although in many cases it has meant great losses and temporary financial difficulties. More particularly does this apply to the pastoralists, who have never had to face a worse season; but, on the other hand, what calls for strong comment is the apathy and neglect displayed by some, who, with a small amount of labour, could have made use of natural facilities and resources to the betterment of themselves and their industry.

It is seeing this that again urges me to bring before the Queensland farmers the advantages of co-operative effort. It has been pointed out that the success of the producing interests of the Continental States is due to the efforts of the producers themselves by organising themselves into local institutions with the object of helping each other. I have been frequently met with these arguments: That our country districts are too isolated; that the State is too thinly populated; that the farmers will not combine; and that if you try to assist them in this direction the farmers think you want to have them. The fact is, that the farmer is too suspicious. These are the statements I have met with, and my intention is, in these few lines, to have a little practical talk to farmers in this State on organised co-operation.

How to Commence.

In every district I have visited from Gladstone to Roma, I have met a few solid men, serious thinkers, quiet workers—men who have a heartfelt interest not only in their own particular farm holdings, but in their districts, and who will do all in their power to assist their neighbours in every possible way. It is on these men that the initiation of a co-operative movement must depend for success. Co-operation has a wider and a higher meaning than the purchase of cheap fodders, manures, seeds, &c., or the sale of fruit, vegetables, or any farm and dairy products. One of the greatest benefits, and perhaps the best, is the influence co-operation has upon social life. In Denmark and other European States and Canada the co-operative society is the pioneer of goodwill, united interests, and social reform. The spirit of isolation is broken down, and mutual self-help is the order of the day. The best Government we could possibly desire or place in position could not produce that benefit to a local community which it can create for itself by adopting co-operative methods. The first step is the formation of the individual farmers into a society within defined areas. Then a room centrally situated must be secured, having sufficient capacity to be utilised as meeting-room, reading-room, village library, concert-room, &c. Now, the first thing that I generally hear is about the cost and where the money is to come from? But this is an old cry. If funds are required for a picnic, cricket or football club, or for any other amusement, they are easily procured, but I acknowledge the apathy shown in trying to raise funds for industrial purposes. Still, I have not heard of many concerts failing in the country districts either for want of funds or people to carry them on; and this thought comes to me whilst writing, that if we wish our society to succeed we must have harmony, and a social evening with slight refreshments contributed by our country friends would be appreciated by one and all occasionally. I am sure the good which could be done would be incalculable.

Will one of our newly formed farmers' associations take this up, get all the members to assist, form a good energetic committee, pick your enthusiastic workers, and start the ball rolling? Others will learn and follow the lead.

Meet once a week, invite lecturers to give you short addresses on practical subjects of interest. Our farmers have a lot to learn, and meeting together socially at first paves the way for more practical work of a lasting nature.

Co-operation for Marketing.

In agricultural production the benefits to be derived from co-operation in marketing are tangible and real from the start. A practical lesson has been learned in this direction this year by the citrus-growers. The economic advantages of distribution by combining and forwarding under a central body have proved most satisfactory. The main object is to endeavour to bring producer and consumer into direct contact, if possible. This object was also attained by the writer in starting and organising the retail markets at South Brisbane, where farmers have the privilege of attending and disposing of their products direct to the consumer at a nominal charge for the space occupied. There are now signs pointing to the establishment in the near future of wholesale market sales on co-operative lines. I do not want it thought or understood that I am advocating the total abolition of the middleman, or that I want to create a new system to disorganise existing conditions at once. The system it is desirable to introduce must gradually grow. The producer cannot at first distribute his products at the doors of the consumer.

What is desired in the first stages of co-operation is for the producers to exercise some control over the distribution, and to lessen the number of middle profits and exorbitant commission charges. The farmers, by co-operating to consign their products in one parcel, get them carried at lower individual cost, and more care will be exercised in handling the consignments. I leave this with the farmers to consider. The matter is in their own hands; it is their product; they can have the say and the control. Will they organise?

By co-operation and mutual self-help, we can do a great deal to better our condition without "State aid," but we have much to learn in the way of knowing what to grow, how to grow, and how to market so as to suit the taste of the consumer. For this we ask for expert advice in the lecture-room on general knowledge, and in the field for practical demonstration. In this direction we appeal strongly to the Department of Agriculture, and to those members who are to-day representing this State's various industries, to assist in no niggardly fashion. There never was a time in this State's history when such urgent action was required to assist in every way possible to help our man on the land to help himself. Practical men will know the value of this suggestion. To them I say, do not mind the people who say such work is not practicable. Start at once organising—money always follows intelligence. Co-operate, and the higher you raise your standard of production the more cash will be received for your labour, and the more comforts it will bring to your bush homes. Other things will suggest themselves to you as you progress. The society which first leads will soon have imitators. All that is wanted is a start, and an urgent desire to educate our producers into better systems of production and marketing, and develop our industries on sound lines. This can only be done by sinking individualism and co-operating, that you may leave a progressive Queensland for your children to live in and enjoy.

TO DESTROY RED ANTS.

Mix flour, sugar, and arsenic to the consistency of putty with water, and place pieces of the mixture about the nests of the ants. If an examination is made a few days after using this remedy, hundreds of dead ants will be found in the vicinity of the poison, and it is very unlikely that the ants will reappear in a spot where the mixture has been used.

Dairying.

A TRUE TESTING STORY.

The *Tasmanian Agricultural Gazette* takes the following from the *Farmers' Review*, U.S.A. :—

Two dairymen each supplied a creamery with about 500 lb. of milk daily from a herd of cows which each man was justly proud of. For some unknown reason the test of one patron's milk was uniformly about ½ lb. higher than the other. This difference occasioned some good-natured discussion between the two men, but as they both had perfect confidence in the Babcock test, and were not suspicious of either the butter-maker who did the testing or the manager of the factory who did the figuring, the tests were accepted as showing the superiority of one herd over the other so far as the test of the milk was concerned. In the course of time it so happened that a student of the Wisconsin Agricultural College visited one of these farms, and tested some of the cows. While engaged in this work one morning he needed one more test to make the tester balance, and as the can of milk to be sent to the creamery was near he took a test out of that milk and ran it with the others from the single cows. The owner of the herd chanced to come around as the completed tests were being read, and he noticed that the test of the milk going to the creamery was about ½ per cent. higher than he had been in the habit of getting at that place; he therefore asked the student to test the can of herd milk each day just before it was sent to the creamery. This was done, and the farm test was always higher than had been received at the factory for several months. Neither the student nor the owner of the herd could explain the difference, so the matter was taken to the creamery for investigation.

A search for an explanation was diligently and honestly made by all parties concerned, many arguments and experiments were proposed, but without going into details about them we will give the final result of the evidence obtained. It seems that the custom of this butter-maker was to test each patron's milk in the same test bottle every week; the creamery was so steady-going there were few changes in the number of patrons, and few test bottles were broken, so this practice could be easily carried out without any disturbance in the routine work. Such a system, however, proved to be the cause of the low test always coming on one man. The investigation showed that the test bottle which had been used constantly to test the milk coming from the farm where the student was testing was not correctly graduated, and the results it gave were always about ½ per cent. too low. The unusual practice of the butter-maker to test each patron's milk in the same test bottle was therefore the cause of all the trouble; the defective bottle always cheated the same man. After making this discovery, the patron began to figure how much he had lost by this deal, as it was a clear case of failing to get pay for ½ lb. of fat for every 100 lb. of milk which had been tested by that bottle. A few calculations were made, and the damage done by the defective bottle was settled for 25·00 dollars by the owner of the creamery.

This little experience shows three things—first, that all test bottles ought to be carefully examined and the graduations tested before the bottle is used; second, that, although tests may be incorrect, the maker of them is sometimes innocent of his error; and, third, that every man who sells milk ought to have a Babcock tester, and he ought to use it.—E. H. Farrington, Wisconsin Dairy School.

THE DUAL-PURPOSE COW.

After reading a large amount of sense and nonsense as to what a dual-purpose cow is, and what she is not, we (*Dairyman*) have concluded that she is a beef cow not quite so perfect as the single-purpose beef cow; and that she is a dairy cow not quite so perfect as the single-purpose dairy cow. She would not win a first prize at a dairy cow show, nor at a beef cow show. But if a farmer wants a fair "show" for his money the dual purpose cow is as likely to win as any other on the farm.

PRESERVING BUTTER, Etc.

It is stated (writes the *Dairy*) that a Danish dairy expert has now, after experiments extending over several years, succeeded in perfecting a new method for preserving butter, margarine, and other articles of food for a year or more without their suffering any tangible alteration in quantity, smell, or taste, even if the goods are kept under unfavourable circumstances, such, for instance, as being exposed to heat, which would otherwise in a very short time materially deteriorate the article. Samples which had been kept for a year under the seal of the Danish Public Notary were opened in the presence of experts appointed by the commercial court, and they declared them to be fine, first-class goods. Reports from eminent analysts state that no added substance could be traced. The invention is likely to prove of considerable practical importance, and a syndicate has been formed for its exploitation.

BEETROOT FOR DAIRY COWS.

Although the cultivation of beetroot for the purpose of making sugar has so far been a failure in Victoria, dairymen are beginning to realise the value of beetroot as a fodder for their stock. The story of a very successful experiment in this direction was told recently in the *Argus*. It seems that Mr. W. Thomas, a dairy farmer near Traralgon, in Gippsland, began feeding his cows on beetroot at the end of March, with the result that from nineteen cows on half-an-acre his milk cheque came to £36 17s. for two months. Mr. Thomas's next-door neighbour, Mr. Beard, was much impressed with these results, especially as from fifteen cows, fed in the ordinary way, he had received £7 5s. only for the month of April. Mr. Beard therefore began to feed on beetroot at the end of April, and was gratified to find that for the month of May his milk cheque rose to £13 7s. 1d. In reply to questions as to the variety of beetroot most suitable for the purpose, the Agricultural Department (Victoria) recommends the following varieties:—Vilmorin's Improved, Heine's Vilmorin, White Silesian, Imperial Red, and Pans Yellow.

CURE FOR WORMS IN SHEEP.

We (*Pastoralists' Review*) are informed by a subscriber in Uruguay that Mr. Hugo Tidemann, of Flores, has discovered a simple, but certain, cure for "lombriz," or worms in sheep. This is to keep them from forty-eight to sixty hours without water, and then give them to drink a solution of common salt in the proportion of 20 lb. to 26 lb. for each 100 quarts of water, about half-a-pint for each animal. Two hours after taking this they can be given fresh water. Too much salt water is apt to kill the animals, but so far Mr. Tidemann has only lost four for each 1,000 cured. Another friend writes us to say he used to get a lot of lung worm, but after he fenced off all stagnant water, and only allowed his sheep to get well water, he had no more worms.

TUBERCLE BACILLI AND TUBERCLE POISON.

A new work on tuberculosis has been published by Behring, who gives the results of his investigations into the nature of tubercle poison and of the characteristics of bacilli in human and animal organisms. The investigations extended over a period of six years, and are said to prove that bacilli extracted from tuberculous men and oxen are of the same species, the differences in appearance, growth, and virulence being explained by the adaptiveness of the bacilli to the conditions of life of the organisms they attack. The identity of the species is said to be proved by the fact that the specific poison produced by the tubercle bacillus is chemically and physiologically the same whether it be extracted from men or from oxen. Further, it is stated that, by treating oxen with tubercle bacilli of human origin, it is possible to produce complete immunity from infection. It is asserted that the principle of this treatment is being applied with increasing success in various parts of Germany.—*The British Food Journal.*

VALUE OF COTTON SEED TO THE FARMER.

The results of two years' feeding experiments with milch cows to determine the value of cotton seed to the farmer are reported in a bulletin of the Mississippi Station, of which the following is a summary :—

The facts as demonstrated are : (1) 1 lb. of cotton seed has a greater value for feeding cattle than 1 lb. of corn ; (2) 1 lb. of cotton-seed meal has a feeding value about equal to 2 lb. of corn ; (3) that at least 85 per cent. of the fertilising ingredients in the feeds is excreted by the animals fed, and may be recovered in the manure ; (4) that nearly half of the fertilising ingredients excreted is found in the urine ; (5) that both cotton seed and cotton-seed meal may constitute a very important part of the grain feed of cattle without injury to their health ; (6) that cotton seed and cotton-seed meal, when fed to dairy cows in proper quantity and properly combined with other feeds, do not injure the quality of either milk or butter.

With corn at 40 cents per bushel (about the average price in this State) a ton of cotton seed is worth 16·70 dollars as a feed for either beef cattle or dairy cattle. At present prices for commercial fertilisers, nitrogen costs about 12 cents per lb. and phosphoric acid and potash each 5 cents per lb. Allowing these prices for the same ingredients in manure, we have 9·90 dollars as the fertilising value of the manure for each ton of seed fed, making for a farmer a total value per ton of 25·79 dollars. Farmers sell their seed for 4 dollars to 6 dollars per ton. Some of them sell for 2 dollars per ton.

In a similar way we find the feeding value of 1 ton of cotton-seed meal to be 28·56 dollars, and the manure to be worth 19·13 dollars for every ton of meal consumed, making a total value of 47·69 dollars that a farmer might derive per ton by first feeding the meal to cattle and applying the manure to his land * * *

The cotton crop for the south (in 1897-98) was 11,200,000 bales and 5,600,000 tons of seed, having a combined feeding and fertilising value of 144,424,000 dollars. At 5 dollars per ton the seed would have brought 28,000,000 dollars. * * * The farmers of the cotton belt lost 116,424,000 on this one crop.

The present disposition of the cotton-seed crop secures to the farmer a very small part of its real value, and must of necessity give place to a practice that will secure to the farmer the maximum benefit which he may derive from this product.

The time will come when the southern farmer will realise that the fertilising value in cotton seed must stay on the farm to maintain its fertility and productiveness.

Plate XVI.

ROSEBUD, JERSEY COW.

The Property of Mr. H. Chambers, Yeerongpilly.

He will not always regard the matter of hauling as of no consequence—as something which he can do without cost. If the best disposition of cotton seed is finally demonstrated to be to extract the oil for human food and other commercial purposes, and let the meal and hulls go back to the farms to serve both as feed and fertiliser, then most likely there will be a small oil mill at each ginnery, and oil and lint will be the only products of the cotton crop sent to the market.

The southern farmer, however, need not wait for oil mills. He may get the full value of his cotton seed by a judicious system of feeding, accompanied by the most careful saving and proper use of the manure.—The Editor, *Florida Agriculturist.*

MILKING COMPETITION AT THE NATIONAL ASSOCIATION'S EXHIBITION, 1902.

Great interest centred in the milking tests at the late Exhibition at Bowen Park. The three cows which were entered for the forty-eight hours' trial were Mr. W. T. Beck's Daisy, Mr. H. Chambers's Rosebud, and Mr. J. Carr's Nellie.

Rosebud, it should be mentioned, was driven from Yeerongpilly to the show ground, a distance of over 7 miles, on the day before the milking test began. The following are the results:—

Owner.	Name of Cow.	Weight of Milk.	Percentage of Butter Fat.	Weight of Commercial Butter.
		FIRST DAY.		
		MORNING.		
		Lb.		Lb.
Mr. Beck	Daisy	20	3·8	·85
Chambers ...	Rosebud	15¾	4·2	·74
Carr	Nellie	12¾	7·0	1·00
		EVENING.		
Mr. Beck	Daisy	10	6·6	·73
Chambers ...	Rosebud	15¼	5·2	·88
Carr	Nellie	7⅝	8·0	·68
		SECOND DAY.		
		MORNING.		
Mr. Beck	Daisy	14¼	3·2	·51
Chambers ...	Rosebud	16¾	4·2	·78
Carr	Nellie	11	5·8	·71
		EVENING.		
Mr. Beck ...	Daisy	12¼	4·2	·57
Chambers ...	Rosebud	16¾	5·0	·93
Carr	Nellie	8¼	6·3	·58

IN ORDER OF MERIT: BUTTER YIELD.

	Rosebud.	Nellie.	Daisy.
First Day	1·62	1·68	1·58
Second Day	1·71	1·29	1·08
	3·33	2·97	2·66

Mr. H. Chambers' Rosebud first for heaviest weight of milk in forty-eight hours—64½ lb.
Mr. J. Carr's Nellie first for heaviest amount of butter at one milking—1 lb.

THE AWARDS.

The prizes in this division were thus awarded:—

Cow yielding from one milking the largest quantity of butter fat (Babcock tester). First prize, £2; second prize, £1 (including £2 2s., presented by Messrs. Marshall and Slade).—J. Carr's Nellie, 1 lb. weight at the morning milking on the 13th. Thurlow's special prize, valued at £1 5s., under the same conditions, went to Mr. W. T. Beck's Daisy.

Cow yielding largest supply of milk in forty-eight hours, subject to result from Babcock tester, of not less than 2·8 per cent. of butter fat.—H. Chambers's Rosebud, with 64½ lb. weight of milk, and, as shown above, an output of 3⅓ lb. of butter in the forty-eight hours. Rosebud also took the special prize of £5 5s., offered by the *Sydney Mail* proprietors, with same conditions as above.

Mr. Chambers was awarded the prize for the best Jersey cow and for the family group, Rosebud, Coconut, and Dairyman. Last year Rosebud was first in the family group, and in 1900 she took the first prize in the dry class, and after an interval, when she was not exhibited, she took first prize in the three years and over in milk class. Our illustrations are reproduced by some excellent photographs by Tosca.

A REMEDY FOR MILK FEVER.

The Maryland (U.S.A.) Agricultural Experimental Station has issued a bulletin upon the Schmidt treatment of milk fever in cattle, claiming for it 670 recoveries out of 779 cases treated or over 86 per cent. This treatment assumes the disease to be due to the elaboration of a toxin in the udder. All the apparatus required is a 3-inch funnel, 4 or 5 feet of ¼-inch rubber tubing, and a small glass pipette or milking-tube. The following is the method of procedure :—

1. Dissolve 120 grains of iodide of potash in 1 quart of water, which has been boiled and allowed to cool to about the temperature of the body. The iodide of potash must be thoroughly dissolved.
2. Introduce the fu nel and pipette into the ends of the rubber tube, and place in a bucket of antiseptic fluid made from either of the three following formulæ:—(1) Creolin, 1 part; water, 30 parts. (2) Thymo-cresol, 1 part; water, 30 parts. (3) Chloro-naphtholeum, 1 part; water, 30 parts.
3. Milk the udder dry; then place under the cow a piece of oil-cloth about a yard square (a carriage storm apron may be made to answer), so that the udder will be about the middle of the cloth. Wash the udder and teats thoroughly with caustic soap and warm water, rinsing carefully with antiseptic fluid.
4. Insert the pipette into the end of a teat, and fill the funnel with iodide of potash solution. By passing successively from one teat to another, distribute the solution equally among the quarters of the udder.
5. Rub the udder from the teat towards the body, and massage thoroughly, in order to distribute the solution throughout.
6. Eight or ten hours after the injection, or when recovery is assured, the udder should be carefully milked out, and then bathed with warm water (about 160 degrees Fahr.).

A second injection is rarely necessary, but if so, it should be done at the end of six or eight hours.

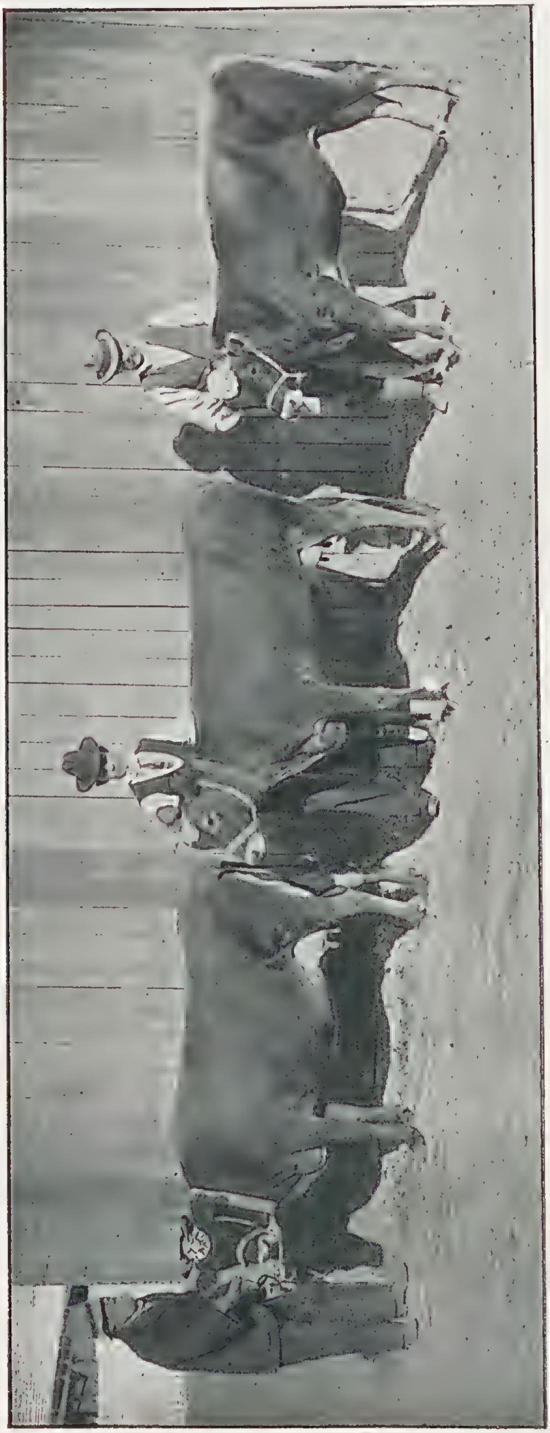
If there should be a tendency towards hardness of the udder or "stringiness" of the milk, baths of warm water should be applied every three or four hours until relieved.

HOW SOUTHERN BUTTER FACTORIES PAY.

We have no returns showing what is being done by Queensland butter and cheese factories and creameries, but an idea of their profits may be gained from the following reports on some southern factories, which with the succeeding notes on hand separators and silos we take from the *Dairyman* :—

The third annual report of the Illawarra Co-operative Central Dairy Company, Limited, for the twelve months showed that through the severe drought there was a falling-off in the supplies in comparison with the previous year. Nevertheless, 397 tons of butter were manufactured, and the number of

Plate XVII.



Mr. H. Chambers' Jerseys at Bowen Park.

Rosebud. Coconut. Dairyman.

suppliers during the spring increased to 118. After writing 15 per cent. off the building and machinery, and transferring £1,000 to a reserve account, there remained in the profit and loss account a credit balance of £727. From this it was decided to pay a 5 per cent. dividend, and carry the balance forward to next year.

A highly satisfactory state of affairs was disclosed at the half-yearly meeting of the Molong District Dairy Company. The statement of assets and liabilities showed a balance of £250 in favour of the former. During the six months ending 30th June 136,000 gallons of milk were received, from which 58,898 lb. of butter were received, the sale of the latter amounting to £3,209. Although the present season is the worst experienced for many years, the factories and creameries are still kept running, and the returns for the past month show an increase in the milk supply compared with the months of May and June. A fair profit resulted on the past half-year's working.

The adjourned half-yearly general meeting of the Moruya Co-operative Dairy Company, Limited, was held on 2nd August. The report and balance-sheet were considered very favourable, and were unanimously adopted. During the six months 155,200 lb. cheese were disposed of, realising $6\frac{3}{4}$d. per lb. gross; and 16,000 standard gallons of milk were paid for at $5\frac{5}{8}$d per gallon. The retiring directors and auditors were re-elected unopposed. A dividend of 4 per cent. on all paid shares for the twelve months ending 30th June was declared.

The Pambula Dairy Company during the past month turned out 20,600 lb. butter, realising 18d. per lb. The gross working expenses were $1\frac{3}{4}$d. per lb. Suppliers received £550 net.

The Wolumla Creamery Company, for the same period, manufactured 18,140 lb. butter, realising £1,381, the working expenses averaging 9 per cent.

The report and balance-sheet of the Clarence River Pioneer Dairy Company shows that the income for the six months under review was about £17,000, and the payment per gallon of milk was over 5d. During the period 276,000 lb. of butter were made. The company is extending its premises and improving its plant.

For the month of June the Robertson Dairy Company paid suppliers $18\frac{1}{2}$d. per lb. for butter fat, being equal to 7d. per gallon for milk. The average test was 3·8. It took 22 lb. milk to make 1 lb. of butter.

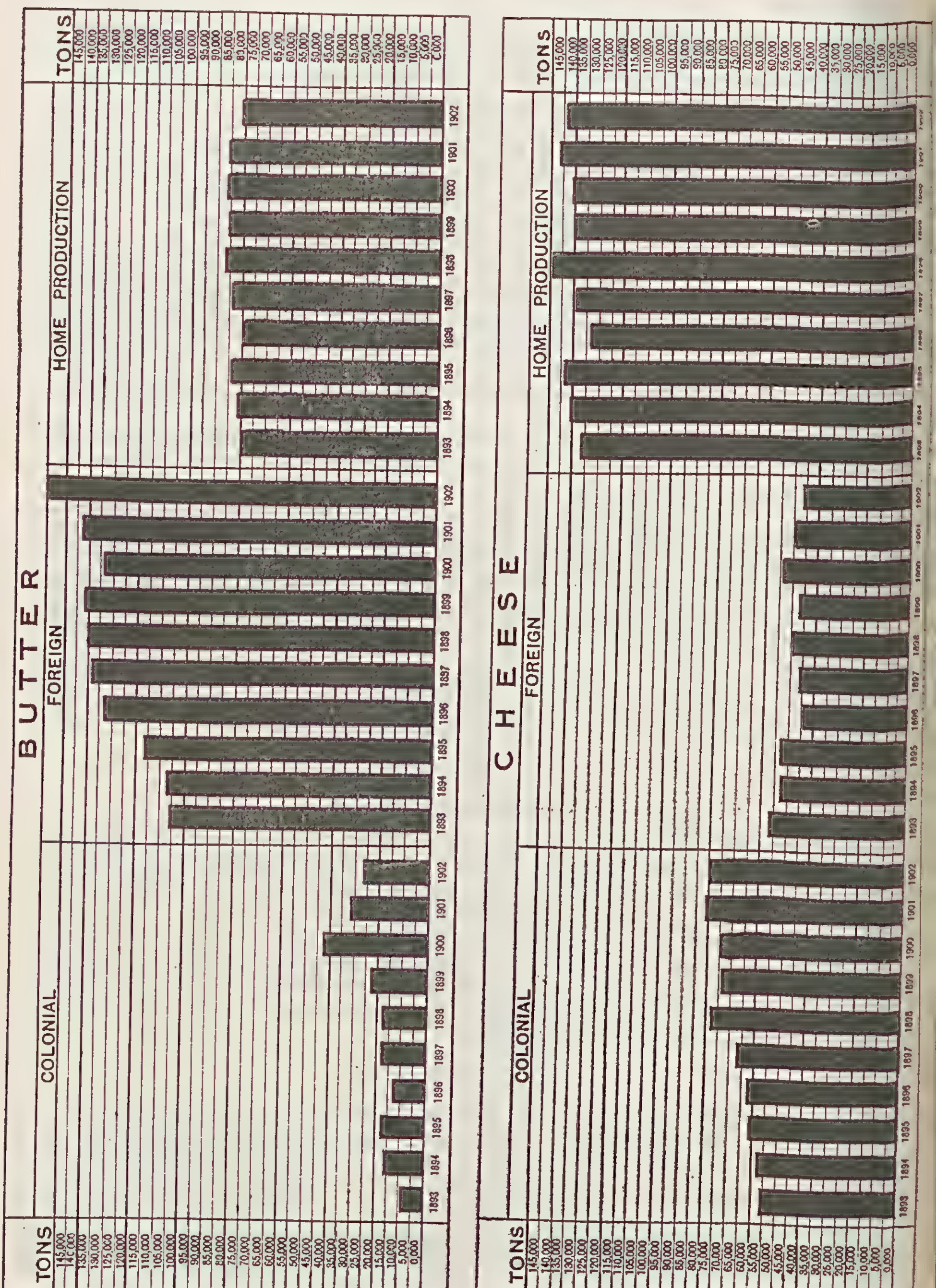
POWDERED MILK

is now a commercial commodity. It is made in two "sizes"—namely, that from whole milk, and that from skim milk. Prof. Max Ekenberg, Sweden, has invented a machine that makes powder out of these two sorts of milk. The cost of reduction is said to be 27 cents for whole milk, and the "skim milk flour" can be made for 13 cents per lb. The "flour" in its dry state may be transported in bags, boxes, or barrels or similar receptacles, and does not turn sour or change in any way as long as kept from water. When mixed with water it returns to its original condition, and can be used for any purpose for which ordinary fresh milk can be used.

COLONIAL DAIRY PRODUCE IN BRITISH MARKETS.

Messrs. W. Weddel and Co., London, in addition to their usual report on colonial dairy produce, have issued a very comprehensive table of colonial dairy produce in British markets for the last five Australian seasons ending 30th June, 1902. The first table shows the weekly wholesale prices of French first butter, Danish salt butter, Australasian salt butter, Canadian cheddar cheese, and New Zealand cheese for those seasons. The second table shows the monthly and yearly average wholesale prices of Danish and Canadian cheddar cheese. The third gives the monthly and yearly average wholesale prices of Australasian butter and New Zealand cheese.

The fourth and fifth, which are here reproduced, show the imports of colonial and foreign butter, and the estimated home production for each of the last ten years and the imports for the same period of colonial and foreign cheese together with the estimated home production—



HOW TO USE HAND SEPARATORS.

Professor H. H. Dean, of Canada, gives the following good advice:—A great many who use hand separators take the warm cream from the separator and put it in with the cream that has been skimmed in the morning or the previous day. That practice will result in a poor quality of butter every time. Cream from the separator should always be cooled at once to a temperature of 60 degrees, or lower, otherwise it will be worse for butter-making than that obtained in the old way without separators. Neglecting to wash the machine properly and neglecting to cool the cream properly are the two great evils to guard against in the use of a hand separator. If these two points are very carefully observed, we shall have a better quality of cream, but not otherwise.

MAIZE ACREAGES FOR VARIOUS SILOS.

After a paper recently read at the Kansas State Dairyman's Association, the author answered the following amongst several other questions:—

What is the estimated size of the silo needed, and number of acres required for a given number of cows, for a feeding season of 180 days?

I have arranged the figures in the following table:—

No. of Cows.	Estimated Consumption of Silage Tons.	Size of Silo Needed. Diam. Height.	Average Acres Maize Needed.
6	20	9 x 20 10 x 16	1 to 2
9	30	10 x 22 11 x 20	2 to 3
13	45	10 x 29 11 x 25 12 x 22 13 x 20	3 to 4
21	74	11 x 37 12 x 32 13 x 29 15 x 24 16 x 22	5 to 6
25	90	12 x 38 13 x 33 14 x 30 15 x 27 16 x 25	6 to 7
30	108	13 x 38 14 x 34 15 x 30 16 x 28 17 x 26	8 to 9
35	126	15 x 35 16 x 31 17 x 29	9 to 10
40	144	16 x 35 17 x 31 18 x 29	10 to 11
45	162	18 x 32 19 x 29	11 to 12
50	150	17 x 38 18 x 34	12 to 13

Poultry.

POULTRY FARMING.

We have always advocated the principle of "going slow" in the matter of poultry farming. The experience of Mr. Gordon on Magnetic Island, Townsville, which he has related to us, is a good proof of the necessity for care in the selection of a site for such an establishment, and for providing for the proper feeding of the birds. Mr. Gordon some three years ago selected three portions of land on Magnetic Island, in Cleveland Bay, about 10 miles from Townsville. Here he planted an orchard of 250 papaw trees, besides comquats, mangoes, soursop, and other fruit trees. He also put in sweet potatoes and cassava. Then the drought came on. He had expended something like £250, besides his own and hired labour. The continuous dry weather nullified all his efforts. He was compelled to sell off 150 fowls and consume nearly all the rest. His pretty poultry farm has dwindled to five hens and a cock. The sweet potatoes, which should have yielded 4 or 5 tons per acre, were dug up to be used as baits for the wallaby traps. The soil is dried up to a depth of 20 feet, yet he has two wells of splendid sweet water. With the indomitable perseverance which characterises Queensland farmers as a body, however, he makes the best of things, and intends by dint of hard work night and day to convert his property into a beautiful "resting place." As he has received voluminous advice from Mr. Newport, Instructor in Coffee Culture, he will no doubt, with the return of of fair seasons, realise his desire to conquer nature and eventually come out on top. It is such courageous men as Mr. Gordon who form the backbone of the rural community of the State.

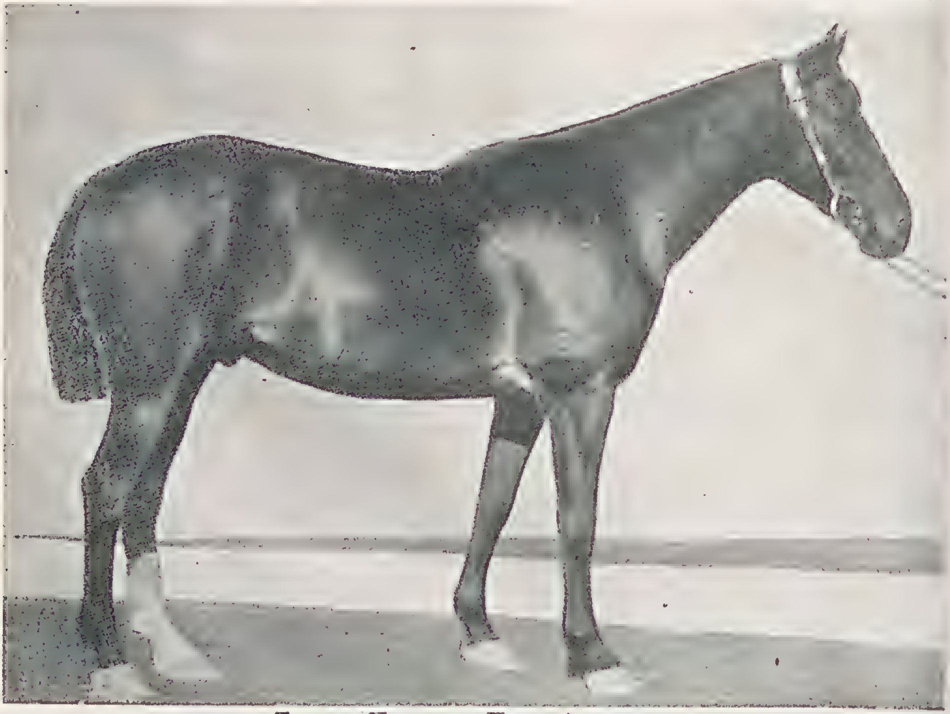
FEEDING THE SITTING HEN.

A sitting hen should only be fed once a day. If her appetite is decent, she should get hard grain only, and for preference maize. The latter keeps up the heat of her body much better than any other kind of grain, although a feed of barley may be given twice a week as a change. If she will eat little or nothing, then she must be tempted with soft food. A little oatmeal, with some barley-meal, is best, and as soon as she will take to hard grain it is better that this alone should be supplied. Green food should not be given, as this has a tendency to relax the bowels, which is undesirable. Sharp grit should be in a box at hand, although sitting hens seem to pay little attention to it, and a supply of pure water should also be given. It is better to give them their corn first, however, as they are likely to drink so much water that they will eat very little afterwards. A dust bath should always be waiting them after they come off the nest. This is most necessary for their comfort, and should never be omitted.

A CURE FOR INDIGESTION.

The following is said to be a good remedy for indigestion:—Get half-a-pint of Stockholm tar, and put it in a fruit jar capable of holding two quarts. Let the tar run all round the jar, and then fill it with boiling water. Let it stand for twelve hours, and then pour off the water, and take a wineglass of the water before each meal.

Plate XVIII.



1

Type of Horse for Horse Artillery.

No. 3642.—Bay Australian Gelding. Age, six years. Height, 15·2. Weight, 1,196 lb.

3

Type of Horse for Cavalry.

No. 2981.—Brown Australian Gelding. Eight years. Height, 15·2.

The Horse.

ARMY HORSES.

If the war in South Africa has opened the eyes of the military authorities in England to the many defects of organisation and equipment of the British army, it has been no less effective in bringing into prominence the pressing need for a scheme by which a strong reserve of suitable horses for army remounts, not only for times of peace, but for the requirements of warfare, can be always ready for emergencies. The present system—or no system—of obtaining the needed supplies is antiquated and most unbusiness-like. Various suggestions have been made, but none seem practicable. One of these suggestions is, that the Government should establish stud farms. Another is the establishment of State depôts. A third is the purchase of all remounts at three years old, and a fourth an increase in price for five-year-olds.

It is the third of these schemes which recommends itself to us. If the Government were to pay a good price for three-year-olds, say from £30 to £40, and place them in depôts where they could be trained for a couple of years, farmers would be induced to breed the proper stamp of horse for cavalry, artillery, transport, and mounted infantry purposes. As it is, what farmer would breed horses which he would have to keep for five years in idleness, costing him more in that time than he would eventually receive for them, when he can breed Shire horses, which he can sell at a good profit at almost any age, and which would be of use to him on the farm till a buyer came along? It is thus not at all likely that the Australian farmer will go in for breeding horses for army remounts, when he has such powerful inducements to raise heavy and light draughts. As for price, the Government price in India for horses sold to officers from the depôts is so high that very few officers avail themselves of what should be, under the circumstances, the valuable privilege of acquiring chargers through the depôts.

	Rupees.*
The Government purchase price is	675
Feed and keep for one year, say	250
	925

(about £61). Yet the Government charge the officers from 1,050 rupees (about £70) to even 1,150 rupees (about £76) for chargers. The Horse and Mule Breeding Commission, appointed by the Government of India in 1900-1901, recommended that the Government should not make this handsome profit at the expense of young officers, but allow the price to remain at 750 rupees (£50) for subalterns and 850 rupees (£56) to all other officers up to the rank of colonel on the staff.

From the report of the Commission we make the following extracts, which cannot fail to be of interest to horsebreeders in Queensland:—

For the assimilation of war and peace conditions as far as practicable, the Commission suggest that Australian breeders should be encouraged in future to breed the majority of the horses for the Indian market as far as possible of one type, the weight-carrying hunter of sufficient blood and undeniable substance of height from 14·2 to 15·1.

It is not intended to lay it down that suitable horses of 15·2 should be refused, but, as a general standard, a height of 14·2 to 15·1 should be accepted for all horses. The universal system of pole-draught at present obtaining in the horse and field artillery render this apparently not only feasible but desirable.

* 15 rupees = £1.

It may be assumed that, if it is eventually possible to mount the cavalry and horse the artillery on this type of horse, the general mounting will be as efficient as possible.

This type of horse should be defined as being specially strong in the following points:—

Sufficient quality.

Balance: which can only result from a sufficiently true general conformation.

Depth of girth, and roundness and depth of back ribs.

Shortness of back.

Absolute straightness in forelegs as observed from the front, including the column of leg and its extremities to the foot itself.

Action decided and true all round.

The Commission are aware that such a type can only be attained after the lapse of a considerable period of years, but they are convinced that a class possessing these characteristics should be fixed on as a guide to breeders and purchasers of service horses. The modification of the allotment lists has been proposed with a view to simplifying the operations of both breeding and buying.

The photographs Nos. 1, 2, 3, and 7 represent the class of horse.

At Saharanpur, No. 3810, a bay Australian, six years old (see photograph No. 2), was selected as a typical field artillery horse. He weighed 1,066 lb.

While at Calcutta, the Commission met the Australian shippers, and heard their views on the horse supply, and subsequently the following letter, signed by all the principal shippers, was received:—

"We have the honour to place before you our views regarding the horse-breeding of Australia. In our opinion it is deteriorating, due to the cause of inferior stallions, and exporting most of the best mares, breeders being tempted to sell on account of the high prices given for Indian remounts.

"We think it would be beneficial to the industry if you were to advise the Australian Governments to put a heavy tax on stallions and limit the exportation of mares suitable for breeding. Also, the Governments should supply a number of stallions for the use of breeders at a nominal fee for service."

The shippers further stated that they believed breeders would introduce changes for the benefit of the Indian market, if they knew what was wanted, but that purchasers had different ideas, and there were no principles on which to take action. The kind of horse required, hereinbefore described, may be judged from photographs Nos. 1, 2, and 3, and the type of stallion which should be used in their production may be seen in photographs 14 and 16.

It is not for the Commission to advise the Australian Governments, but it is hoped the Government of India will forward them a copy of this report, in order that the state of affairs, as it presents itself to shippers and purchasers alike, may be brought to their notice.

It has been urged upon the Government that it would be an improvement to establish depôts in Australia, and buy remounts in that country.

The Commission consider that the following objections are sufficient to deter the Government of India from adopting this scheme:—

(*a*) That the experiment has been tried, and proved a failure.

(*b*) Thas an exceptionally skilful and experienced staff of buyers must always be maintained, and any want of tact or judgment on their part might result in the formation of an adverse ring among breeders.

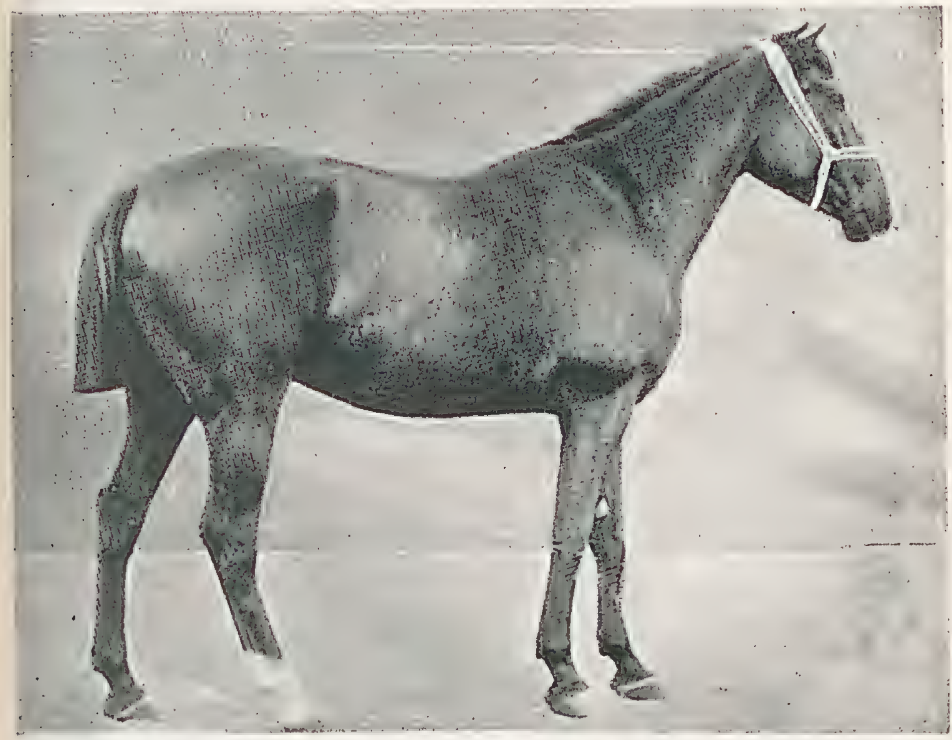
(*c*) That a heavy outlay in purchase of land and erection of a depôt would be necessary. It is understood that good land, conveniently placed, could not be acquired for less than £10 per acre, and the risk of disease breaking out would be considerable unless there was a large range of paddocks.

Plate XIX.

 2

Type of Horse for Field Artillery.

No. 3810.—Bay Australian Gelding. Six years. Height, 15·1. Girth, 70½ in. Shank, 7⅝. Weight, 1,066 lb.

 7

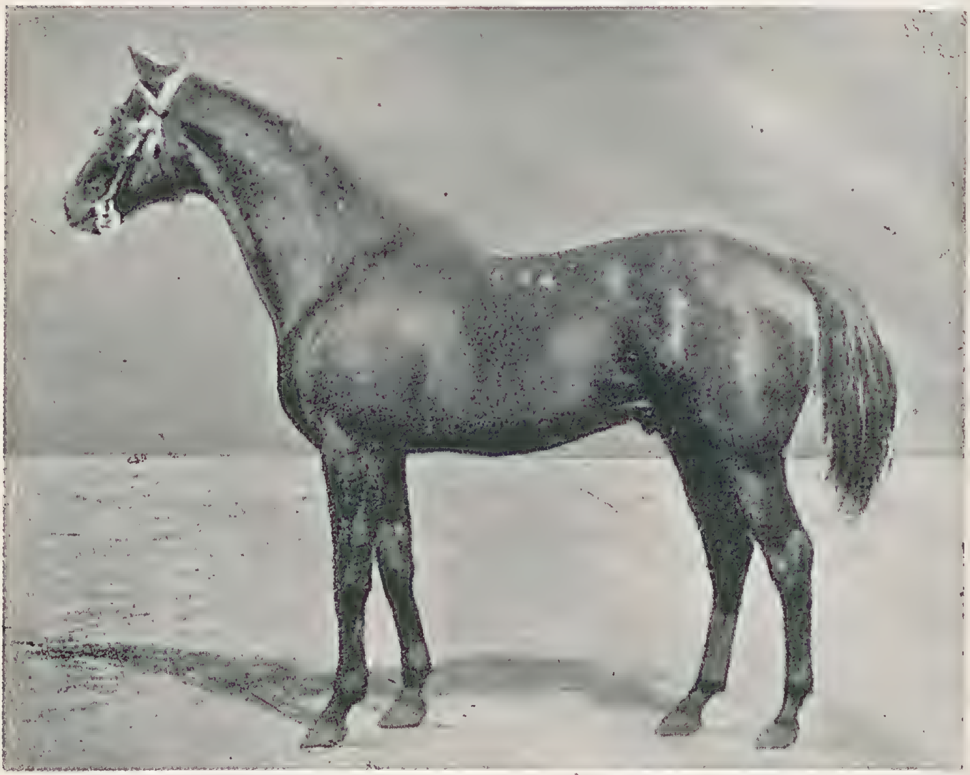
Type of Country-bred by an Arab out of an Australian Mare. Fit for Horse Artillery.

Black C. B. Gelding, by Sheik (Arab); dam, Australian mare. Four years seven months. Height, 15·2½. Girth, 73¼ in. Shank, 8½ in. Weight, 1,114 lb.

Plate XX.

TYPE OF THOROUGHBRED ENGLISH STALLION REQUIRED.

Wicklow Spar—by Kendal (by Bend Or) out of Birdseye, by Canary. Ten years. Height, 15·2½. Girth, 72 in. Shank, 8½ in. A sure foal-getter; has got excellent stock.



TYPE OF THOROUGHBRED AUSTRALIAN STALLION.

Pickwick—by Swiveller; dam, The Gem. Brown Australian Horse. Nine years. Height, 15·2¾. Girth, 69 in. Shank, 8 in. A sure foal-getter; has got excellent stock.

(*d*) That it is very difficult to select "eye-sound" horses of suitable type from a mob of unhandled animals, and a number of "misfits" would be the inevitable consequence. These, a dealer could get rid of perhaps without much loss; but a Government buyer in a similar position would be certain to lose heavily.

(*e*) That there would be complaints of interference with a trade.

(*f*) That the establishment of such a concern would absorb money, energy, and attention which would be better employed in fostering horse-breeding in India.

The only reason which can be alleged in favour of the proposal seems to be that the middleman would be got rid of, but, as he takes all the risk up to the moment of purchase in India, his elimination would be of doubtful value. Other serious drawbacks might be mentioned, but enough has been said to demonstrate the impracticability of the scheme which the Commission have no hesitation in advising the Government of India to reject.

On the question of reserve, the Commission would point out that the strength, laid down, is quite inadequate for meeting emergent requisitions in time of war, and, until a sufficient reserve of country-breds is procurable in India, Australia is the country from which the horse supply must be supplemented, and the Commission consider that India should always possess a supply of Australian horses, in addition to mobilisation requirements, sufficient to replace casualties for one year.

Mr. P. R. Gordon, Chief Inspector of Stock, Queensland, in criticising the report of the Commission, says:—"A forty-eight years' Australian experience in stock matters, during a portion of which time I was a successful breeder of light horses in Victoria, warrants me in strongly recommending a stallion tax as the best present means of weeding out the innumerable worthless, nondescript stallions that are working incalculable ruin in our horse stock, and destroying what would otherwise be a valuable national asset."

The consensus of opinion at the Agricultural Conference held last July in Toowoomba appeared to be in favour of a tax on stallions.

EXPENSIVE LADYBIRDS.

Orchardists are all aware of the value of a certain ladybird which feeds on scale insects and consequently is a most valuable insect to growers of citrus and other fruits. It will be remembered that Mr. H. Newport, the Instructor in Coffee Culture, on his first visit to Queensland, had a mission to collect the scale-eating ladybird for transmission to India. The *National Nurseryman* (U.S.) says that Mr. C. L. Marriott, Assistant Entomologist of the U.S. Department of Agriculture, sent to the department headquarters, in Washington, seventeen ladybirds found in China and believed to be a parasite (?) of the San José Scale. These insects arrived last autumn and were carefully tended, but before egg-laying time this spring all died with the exception of two females. These have laid many eggs which have hatched, and the larvæ have been feeding on scale insects provided for them. It is expected that the ladybirds will have increased largely in number by next fall. A test in orchards affected by the San José Scale will be made with the ladybirds, and it is hoped that the latter will be as destructive of the scale insects in this country as they have been in China.

The two female ladybirds which survived have cost the Government $2,000 (£400) each, it is said. If the brood which they have started should be the forerunner of an effective enemy of the San José Scale, the cost will be very small compared with the benefit. Nurserymen, as well as orchardists, will await results with interest.

The Orchard.

GRASSHOPPER FUNGUS.

Mr. C. French, F.L.S., Entomologist to the Victorian Government, has communicated the following interesting information, concerning the preparation and distribution of the fungus used at the Cape for the extermination of locusts, to *Garden and Field* :—

This specific has been used at the Cape for some time for the locust pest, and always proved effectual. Mr. French hit upon the idea of experimenting on grasshoppers, with the satisfactory result as before mentioned.

Full directions for using the fungus are issued with each tube supplied to Victorian producers at the offices of Mr. French, Law Court Buildings, Lonsdale street, Melbourne.

The following are the notes by the Government Entomologist on the preparation of locust fungus, and use of same in infecting locusts and grasshoppers:—

Preparation of Water Fungus.

1st. Place two teaspoonfuls of sugar in a tumbler, open a tube, and remove the fungus contents entire; place this in the sugar, and rub the whole together with a spoon until the material is thoroughly broken up and mixed with the sugar. Then dissolve this thoroughly with three-quarters of a tumblerful of water which has previously been boiled and allowed to cool; float in this three or four pieces of cork which have been previously boiled and allowed to cool, then cover the tumbler with a piece of paper, and place it in a warm corner of the house until the fungus is seen to be growing around the pieces of cork. A temperature of anything fron 70 degrees upwards will cause the fungus to develop in two or three days. The fungus is then ready for use.

To Distribute.

2nd. Make a hoop-net, about 2 feet in diameter, of any gauze-like material, about 2 inches deep, with a handle attached. In this capture the locusts, and dip them into the fungus contents of the tumbler. After a thorough immersion, then take them out, and liberate them; repeat with more locusts, and so on until the glass or vessel has been emptied of its contents. Infect towards evening, and, if possible, when there has been or there are indications of rain. Next, smear patches of grass where the locusts are feeding with the fungus; also capture quantities of locusts, and confine them in a box along with some of their favourite food, which has previously been smeared with the fungus. Water fungus is not so effective in confinement as bread fungus. The bread fungus is more easily smeared over their food. Keep the box under conditions as near to the natural as possible, as locusts will die if too closely confined. In two or three days liberate the lot among a swarm, and repeat again.

To Make Bread Fungus.

3rd. Take about 1 lb. of white bread, which is fairly stale, and then grate it into a coarse powder. Place a cupful in a basin, and add enough water to make a watery paste (water must be previously boiled and cooled); add to this the contents of one tube of fungus, thoroughly mix with the paste (no sugar is required), place a covering over the basin, if flies are numerous, and keep it in a warm place, same as for water fungus, and in two or three days the fungus will be seen growing over the surface of the paste. It is now ready for use.

To Distribute.

4th. This is best used on locusts in the early or hopping stages, and distributed by placing small portions where the young locusts are feeding, and smearing the patches. If rain or heavy dews are prevalent, the moisture thus received will keep the fungus growing until all has been eaten; if weather is dry, carefully water infected patches every evening until the fungus food has disappeared. Catch young locusts in net, and bring them to feed on the infected patches.

Remarks.

A tube of fungus will make a basin of bread fungus, and the fungus growth on the bread will make many glass or water fungus, or basins of bread fungus. If the weather is moist at the time of infection, results should ensue in at least a week; if dry, it may take three or even four weeks. For locusts in the flying or full-grown stages the water fungus is the proper treatment, and is also splendidly adapted to the hopping stage as well. Locusts die some distance away from the place of infection, generally in a south-east direction. They turn a liver colour when dead, and will be found along ditches in grass and depressions of the ground, in clusters and singly, depending whether swarms are large or small. The best results can be obtained by frequent infections in various places, as the insects are easily destroyed in the early stages.

Apiculture.

HOW TO FIND THE QUEEN.

A Californian beekeeper writes to the *Beekeeper's Review* as follows:—

"Blow some smoke into the entrance to alarm the colony. Two or three puffs will be sufficient. Take off the cover, and watch the behaviour of the bees. Those at a distance from the queen will come up between the frames and walk across the top bars. Keep close watch. Finally, at a given point, a dozen or two will stop, and sort of smell down between two certain frames. If these two frames are taken out together, the queen will be about the first thing seen when they are separated. This method never fails with me; but some little experience is necessary in order to catch on to the trick."

TO DESTROY GRUBS AND BLIGHT ON VEGETABLES.

Get the ground ready long before you sow or plant it. Turn it over frequently to give it the full benefit of light and air. A day or two before planting give it a thorough turning over. By doing this, you destroy the grubs and their larvæ. The birds also will help in the work. Next, get some waste from a tobacco factory. Make a strong solution of it. If you cannot get waste, expend a couple of figs of tobacco. Do not use it too strong on very young plants. If grub or fly or blight appear, water the vegetables every other day with it. It will have more effect on insect life than Bordeaux mixture or Paris green. These latter are useful in destroying fungoid diseases, but they are dangerous, as they contain arsenic and copper.

Viticulture.

THE STRENGTH OF WINE IN WHICH THE *SACCHAROMYCES ELLIPSOIDEUS* CAN PERFORM ITS FUNCTIONS.

BY E. H. RAINFORD, Viticulturist.

It is not uncommon to read in literature dealing with winemaking that the limit of alcoholic strength produced in wine by fermentation is 26·5° of proof spirit, or 15° of absolute alcohol by volume on the grounds that, as ferment cells cannot live in a liquid containing more than 26·5° proof spirit, wine containing over that amount of alcohol must consequently be fortified.

Thudicum and Dupré, for instance, in the "Origin, Nature, and Uses of Wine," a book accepted everywhere as a standard work, and which, by the by, is full of errors, state on p. 649: "But even a wine of 26·5° of proof spirit is upon the limits of what is chemically possible, because fermentation even under the most favourable conditions is invariably arrested by the presence of about 15 per cent. of alcohol" (26·6° proof spirit).

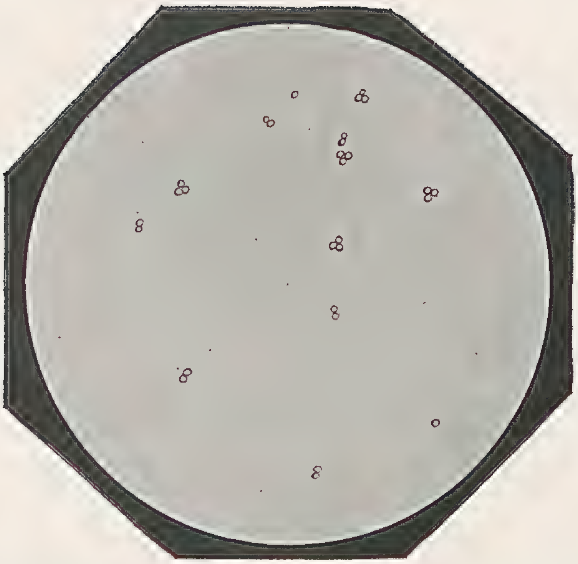
Again, on p. 743, describing a South Australian wine, "Tavoora": "It contained 27·2 per cent. of proof spirit, *and was therefore alcoholized*"; the italics are the writer's. In Sébastian's work on choice wines (Les vins de luxe par Victor Sébastian), on p. 61, is found: "Alcohol is a powerful antiseptic, and arrests the development of ferments when it is added to a fermentable liquid to the extent of 15 per cent." (26·6° proof spirit). Again, in a report of the Board of State Viticultural Commissioners, California, U.S.: "The maximum of alcohol which a wine can attain by the fermentation of rich musts is between 15 and 16 per cent. If the percentage is a higher one, it is *due to the artificial addition of alcohol*"; the italics are in the report. That is between 26·6° and 28·4°, or about 27·5° of proof spirit. Other instances could be adduced, but the above quotations are sufficient to show that this opinion is pretty general. The British Government at one time adopted this view, and fixed the 1s. per gallon duty on wine limit at 26° proof spirit. In legal cases, experts have given testimony against a wine being pure on the ground that it was of a strength exceeding 26·5° of proof spirit.

To show how erroneous is this idea, a short description is given in the article of a wine made by the writer, illustrating the existence of ferment cells in a wine containing 28° of proof spirit. The wine—a white wine—was made in February, 1901, from Verdeilho and Semillon grapes, and remained sweet after the fermentation was finished. As a wine of a dry character was required, a small quantity of fermenting must, which had been gradually inured to the alcoholic strength of the wine, was added to it last February, and a very languid fermentation began, which lasted through the summer; so feeble was it that the wine remained quite clear. An examination under the microscope from time to time revealed the presence of cells of vinous ferment in limited numbers. Lately a strong smell of carbonic acid at the bunghole of the cask showed that active fermentation was proceeding, and on tasting the wine the sugar was found to have disappeared, having been converted into alcohol by the yeast cells.

A microscopic examination showed that the cells of *Saccharomyces ellipsoideus* were fairly abundant, the appearance of a drop of the wine under the microscope, as reproduced by the Departmental Photographer, being illustrated on Plate XXI.

The wine was then tested for strength by the Government Analyst, and found to contain exactly 28° of proof spirit, which conclusively proves that the cells of vinous yeast will live and perform its functions in a liquid containing that amount of alcohol, and that consequently wines of that strength, and perhaps slightly over, may be perfectly pure and natural.

Plate XXI.



A Photographic Reproduction of a Drop of Wine, containing 28° of Proof Spirit, showing Healthy Cells of Saccharomyces ellipsoideus, or vinous ferment, as seen under the Microscope.

SUMMER PRUNING OF THE VINE.

By E. H. RAINFORD, Viticulturist.

This important subject has been dealt with twice previously in the *Agricultural Journal*, and its general objects and principles fully explained (see *Journals* for October, 1899 and 1900). In returning to this subject again, the writer has no intention of simply recapitulating the information and advice given in those former articles, but, instead, desires to point out how it should be applied to vines that have been pruned on the systems illustrated in the article on pruning in the June number of the *Agricultural Journal*. As has been explained before, a definite system of disbudding and pinching, &c., is a corollary to a given system of pruning; the two must work together to produce a vine of correct shape and sustained cropping power.

To follow the instructions given in this article, readers must turn to the plates of the article on pruning for June.

Bush System.—In Figs. 2 and 3, all buds and shoots should be removed as they appear from anywhere below the scar left by the secateurs seen in the illustration, or two-thirds the way up the stock. Suckers must be carefully cut away close to the stock, no matter how deep under the ground, and not simply broken off at or near the surface; if the latter is done, fresh suckers will appear next year. Of the shoots that appear above the point mentioned, three or four of the best placed should be left, choosing by preference those that start at about the same level on the stock, which will be the future crown of the vine. Carefully tie up the shoots, when long enough, to avoid breakage by wind, and only top them when their length inclines them to get in the way of cultivation operations. When the vine has the shape of Figs. 5 and 7, remove as before all shoots and suckers below the crown (in Fig. 6 a sucker is seen that was overlooked), and in addition to the shoots on the spurs allow two or three well-placed shoots to remain to form new spurs next season, and so on.

Unilateral System.—Of the shoots thrown out by Fig. 2 in the spring, disbud all but two; or, if the vine is vigorous, three. These may be anywhere on the stock so long as they are upright or incline a little in the direction where they are to be tied down, as at A in Fig. 8. Any shoots inclining the reverse way must be suppressed so as to throw the vigour of the vine into the correctly placed shoots. When the vine has the shape of Fig. 9, all shoots from A to the ground should be suppressed as they appear, and also all suckers; from A to the point of the vine, all shoots from buds underneath the cane must be removed, except in two cases—1st, when the cordon has not attained its full length, the *last* bottom eye must be allowed to shoot to make a cane for prolonging the cordon next winter; 2nd, if the vine has only been laid down half its length and is strong, some under-eyes may be allowed to bear fruit for the first year. Generally, it is well, in these two cases, to allow the last *two* bottom eyes to grow, for, if the last shoot be injured, there will be another to take its place, but when this happens the upper shoot between the two must be at once suppressed. When the cane that has been laid down has the eyes placed sideways instead of above and below, the extra shoots may be removed alternately on either side. When the vine is as in Fig. 11, the same precautions must be taken to remove all shoots behind the first spur and allow only those which are growing from the eyes on the spurs, except when a blank space on the stock has to be filled up. It will happen, for the first two years, that the eyes and spurs at the end of the cordon in Figs. 9 and 11 will break first, and, if allowed to get away too much, will rob the other eyes and spurs, which would make poor growth or even remain dormant. This is prevented by pinching those shoots two leaves above the flower clusters, and, later on, pinching back all the laterals, except the top one; the check given to these shoots will enable the others to catch them up—the aim of the vigneron must be to make all his vegetation grow as equally as possible. If, however, the last shoot is growing from a bottom eye,

this is not to be pinched back. When the vine resembles Fig. 14, a little disbudding of the small fruit rod at the end of the vine may be required if it has been left too long; otherwise the same procedure is adopted as already described.

Thomery Espalier.—In this system, the same rules as regards summer pruning should be observed as in the preceding system, until Fig. 9 is reached. Instead of removing all the shoots between A and the ground as for the Royat, one is left to grow from the upper side of the stock at a point from 4 to 6 inches below the bottom wire, as in B, Fig. 10. Only one shoot should be allowed, and that must be carefully looked after and tied up, as it will serve to make the second arm of the vine the following winter, as in Fig. 16. Pinching the shoots on the arm already laid down will assist its growth and development. The same rules are to be observed for vines as in Figs. 16, 17, and subsequently as have been given for the Royat system.

Guyot and Bordelaise Espalier.—The most important point to be recommended to vignerons in these two systems is protection to the shoots from the return spurs, as damage to these means a faulty vine next year. They should be carefully tied up as soon as they are long enough to prevent breakage from wind and other causes, especially in vines that have a tendency to a straggling growth like the Black Hermitage and others

The disbudding of the fruit branches will depend upon the richness of the soil, vigour of the vine, and the number of eyes on the fruit branches. All shoots without flower clusters should be removed, and, if there are enough eyes on the upper side of the canes to absorb all the sap, remove the shoots from the lower side; here, however, the individual judgment will have to be exercised. Severe pinching of the last shoots on the fruit branches must be practised to keep down their growth and give the others a fair start as described above. It is well to leave one or two water shoots on the stock at the level of the return spurs to utilise as spurs, should the necessity occur; if not wanted in the winter, they will be pruned off. Everything else must be removed from time to time, so as to concentrate the sap into the fruit branches.

In the *Cazenave and Mixed Royat systems* the rules for disbudding, &c., are the same as for the Royat or Unilateral cordon until the vines are fully shaped, as in Figs. 26 and 27; the disbudding of the fruit branches should then follow the rules laid down for the single and double Guyot systems.

After a few years, the spurs on all systems of short-pruned vines become elongated, twisted, and knotty; hence difficult circulation of sap in them, abundance of water shoots, and decrease of crop. To avoid this defect, all spurs should be renewed from time to time, and to do this advantage should be taken of the small water shoots that frequently make their appearance at their base. These should, when required, be carefully preserved and utilised next pruning season, but the average vigneron never takes advantage of them, but ruthlessly sweeps everything away except what is bearing fruit. The writer has frequently seen spurs on a vine like the horns of an eland, and the vigneron proudly cleaning off the least vestige of a shoot anywhere but at the apex of the antlers, instead of taking advantage of the precious water shoots, which, if preserved, would be the means of doubling his crop. Bush-pruned vines, if on rich soil, will require careful thinning out of shoots and leaves around the flower clusters when in flower; otherwise the fruit will not set, and straggling empty bunches result. This is because want of air and light prevents proper fecundation of the fruit. On topping, the writer has more than once given his views, and he cannot too strongly condemn the irrational system of shortening the shoots to just above the bunches. Two consecutive seasons, experiments were made on this point at the Westbrook Farm with exactly the same result—viz., the grapes from short-topped vines were 2 per cent. less in sugar, 2 per mille more in acid, and far less richly coloured than were the grapes from moderately-topped vines. Q.E.D. Do not top until the canes interfere with cultivation operations.

Tropical Industries.

COTTON-GROWING, No. 2.

By DANIEL JONES, Department of Agriculture.

Thinning the Crop.

The value of cotton seed as a cattle food no less than as a factor of value in many of our manufacturing industries points out that economy in sowing is a virtue that must not be ignored. There are times, however, when the planter, not being thoroughly acquainted with the vitality or germinating value of the seed, or mistrusting weather indications, may sow more thickly than is, under other conditions, necessary. In this event, thinning out to standard distances must be resorted to. If good seed is sown, in a few days the little plants will be up in clusters of three or four or perhaps singly, but an inch or so apart. As cotton will not thrive under such conditions, the plants must be thinned out to give proper space for vigorous growth. Much discrimination is called for in treating the plant at this stage. To begin thinning too early is not advisable for many reasons. The attack of insect pests, such as crickets and some of the beetle tribe, will in some seasons account for the destruction of numbers of the young plants. Sometimes an excessive fall of rain will wash out the drills, or an occasional hailstorm do some damage to the plants while in their tender stage. The process of cultivation will also to some extent be responsible for the loss of a few more, especially if tilling with implements hard to guide or using horses that will persist in treading on the drills in spite of the efforts of the workman. These are a few reasons why the thinning-out process should not be carried out until such time as these risks are no further to be encountered. It is usually advisable to keep a sharp watch on the attacks of crickets, as in some seasons they become very numerous, and every effort should be made to compass their destruction.

The first thinning should be done when the plants are from 4 to 6 inches high. Plants reaching the height of 12 to 18 inches or so may reasonably be regarded as safely past the critical stage of their young growth, and can be thinned out to the distance determined on by the planter. Upland varieties should stand about from 2 to 3 feet apart in the drills and 4 feet 6 inches in the rows. These spaces give ample room for the spread of the more dwarf varieties of Upland cotton, but for the Sea Island or Egyptian sorts the limits must be increased. The process of thinning will need at times to be a manual operation. Two or three cotton plants growing together in one cluster cannot be separated otherwise. The Dutch hoe will at times prove a very useful implement to use, as well as the common chipping hoe. As cotton is a hoed crop, the workman will attend to thinning out as he carries on his hoeing operations. Frequently considerable assistance can be rendered by the farm hand in his tillage operation. The skilful handling of the horse hoe, the insertion of the side tine either under a cluster of plants or penetrating the drill, will often economically account for many a surplus plant that, left alone, would otherwise mean personal handling to get out of the drill. There is no very definite plan that can be adopted in deciding the question as to the number of plants prudent to leave: it must be decided by the farmer, who has to consider his climatic conditions, character of soil, and the variety of cotton he proposes to grow. The extremes of overcrowding or overspreading plants must be avoided, as in the one instance a stunted, imperfect shrub will be the result, with little cotton, while on the other hand the shrubs will outgrow rational bounds and the crop will be insignificant. The intention of the planter to prune his shrub for the first or succeeding years will also have a reference to the question of close or wide

planting. Where pruning is contemplated, it is advisable to leave the distances apart somewhat greater than if the decision is to cut out the bushes annually. The seasons being equally propitious, pruned cotton will generally form a more robust shrub than the seedling. As the question of pruning will be dealt with in a subsequent article, I will reserve my remarks for that occasion.

Cultivation.

In the struggle for existence with the host of weeds which always appear, the cotton plant during the first few weeks of its growth, and until it has passed its tender stage, will require close attention, in the matter of tillage. Here the farmer will score who has in the preceding tillage operations succeeded in destroying weeds and their seeds. Whether the young cotton plant is to survive in the struggle against weeds during the warm days of spring, and whether it shall outstrip its foes, will depend on the foresight of the farmer. The American aphorism that it is better to hoe twice than once, is our idea of sound rural practice. Cotton responds to intelligent tillage quicker than most crops. Give the crop generous conditions as to rainfall, cultivation, and moderate fertility of soil, and it will soon outstrip the weeds. Sunshine and light are essential to its nature, and it revels in these conditions. Its healthy foliage, its pretty flowers of pink and yellow myriads in number, will all tell the tale of the farmer's treatment. For the reason that sunshine is a material factor in the growth of the cotton plant it is advisable, where the contour of the land permits, to strike the rows of cotton north and south, for the reason that by doing so a little less shade is produced among the shrubs than if the rows were drawn otherwise. As, under ordinary conditions of planting, the farmer will have but two or three months to keep his crop clean, it is imperative his task should not in any sense be neglected. Cotton sown in October will have attained such dimensions by December that no further tillage is possible or required. The planter, as his crop develops, will need to take special precautions to prevent injury by reason of friction of traces or swingle-bars moving too closely to the shrubs. Much damage can be done by neglecting this precaution. Embryo pods are broken off, branches are either injured by barking or breaking, all of which go to diminish the farmer's profits from the crop.

There is one aspect of this cultivation that the farmer needs to take cognisance of at this stage of operations, because it will have a material bearing on the subsequent welfare of the crop. This is the question of pruning of the plant, and which will be discussed later on. I merely point out that the grower at this stage of operations should give some attention to the question, as upon the first year's tillage operations much of the success of the succeeding years of pruned crops will depend. It can be taken without contradiction by all practical farmers that annual ploughing is a greater factor in clean cultivation than is possible without it.

Here, then, is a point to emphasise, which is, that in the event of the plants being destined to remain for one or two years as pruned cotton, the tillage it has received in its first year will have a prominent effect on the value of the crops. I fully believe that in our past practice this feature did not receive the attention it merited, to the disadvantage of the farmer. Whether the cotton-planter determines to cultivate only for seed or to prune his cotton, the question of tillage is important, but more so must it be when the initial preparation of the land has to do with the crop growing in subsequent years. Take, for instance, an area infested with that arch-enemy, couch grass. Given a strong hold during the early cultivation, so hard is it to eradicate that by the time the land has remained over a year without ploughing it becomes most difficult to cope with, and each succeeding year the trouble accentuates. I speak on this matter from personal experience, knowing well the value of precautions in this respect. Those farmers who are cultivating crops that permit of the land being ploughed once if not twice in the year will perhaps treat this matter rather lightly, for it is comparatively easy to keep land moderately clean under such conditions. But given conditions of

warmth and moisture such as often obtain in our spring and summer seasons, when weeds and grass grow apace, this, supplemented by the difficulty of getting the land turned over, will soon prove the need of doing all the tillage well at the outset and as constantly and as early in the season as practicable. This couch-grass trouble can be very much minimised by the careful use of the horse hoe when working beside the drills. A steady horse and skilful driver, provided the plants have grown as they should in straight lines, or as nearly so as practicable, will enable the hoe to safely remove weeds from within an inch or so on each side of the drill. This accomplished leaves little undisturbed soil in the neighbourhood of the young plants. When this is the case, a man with the Dutch or chopping hoe can rapidly remove such weeds or grass as may have established themselves along the drills. Sometimes, by way of variation, should the germinating weed be of the type of the common summer grass variety, the changing of tines, so as to smother the incipient growth by means of throwing a thin film of soil towards the plants, will prove effective; this, however, is only possible in the very young stage of growth or in dry hot weather. The planter will by experience note that in the cultivation of this crop his success hinges on the economical way in which he can direct manual labour. In the tilling of the crop this should have his close attention. No cotton-planter can hope to be successful who overlooks this fact. He will find that when the picking time comes along the matter of manual labour will then be such as to tax his pocket and energies quite sufficiently without unduly increasing the cost of this character of labour by overlooking a single point to his advantage in the earlier treatment of the soil and crop.

There are few crops grown that are easier to keep clean than cotton, especially if it is treated as an annual. However, as the growing period is extended beyond the first year, it necessarily must be a little more difficult to treat weeds. Cotton plants sown in drills, if the plants stand 18 inches or 2 feet apart, and 4 feet or 4 feet 6 inches between the drills, should by this time have interlocked their foliage and be in blossom and bearing young pods. Summer grass will still grow to some extent if the tillage has not been thorough. Then the farmer will perhaps note to his disgust that his crop at picking time is somewhat marred by the presence of grass-seed in the snowy fibre, to the detriment of its appearance and perhaps value, which trouble might have been avoided by more careful tillage. I am aware from experience that, although the farmer's ideal may be for clean cultivation, and strenuous efforts be made to secure that object, there are times and conditions that no man is master of. "The best laid plans of mice and men gang aft agleo" is as much within the experience of rural workers in our State as it is elsewhere. Given wet seasons, our best efforts may be frustrated in the matter of tillage. Despite all risks, I have never yet seen a crop of cotton that could not hold its own with every form of weed life if it only got a fair start in its first stages of development.

COTTON.

Some years ago a good deal of attention was given to the question of cotton cultivation in Ceylon, but, though a number of small experiments were started at the time, we are not aware that a proper trial under the most favourable conditions was given to the cultivation of the plant. With the opening of the Northern Railway the subject is once more being discussed in view of the possibility of suitable areas being found in the regions through which the new railway runs.

The amount and distribution of rainfall have much to do with successful cotton cultivation, and this fact must be borne in mind in selecting soils. The plant thrives in a very warm atmosphere, provided the latter is moist and that severe drying winds are not prevalent. In the typical cotton climate the mean daily temperature increases from the time of seeding till the plant has reached its greatest vigour and stored up all the reserve food it needs for the production

and maturing of fruit. The best type of soil for producing favourable results is a clay loam or medium heavy sandy loam. The soil should be deep, and the sub-soil not heavy and compact. The cotton plant has a well-developed tap-root extending, according to the vigour of the plant and the character of the soil, to a depth of 3 feet or more. The lateral or feeding roots begin usually within 3 inches of the surface, and seldom extend beyond a depth of 9 inches. It is a question whether the practice of planting on ridges is as good as working up the land deeply and then sowing the seed on the level ground. The ridge system grew out of the practice of shallow working to a depth of a few inches, though the seed bed is deepened by throwing up the soil till a depth of 10 inches or more is obtained. A good seed bed is thus formed, it is true; but it will not resist drought as would a level culture accompanied by deep working.

The object of cultivating the land during growth of crop is to prevent loss of moisture in the soil. This is accomplished by maintaining a surface layer 1 or 2 inches thick in a thoroughly pulverised condition. At the same time and by the same means, weeds and grass are kept down. It is very important that the surface layer of loose soil should be constantly maintained. Especially after rain when the soil tends to settle and form a compact surface, a stirring of the top layer should take place. With the production of crop, cultivation should cease, and the plant helped by reducing water supply by preventing surface evaporation. It is precisely reversing the process desired in the early stages of growth, with the object of checking further development of foliage and directing the energies of the plant towards making use of the materials it has already accumulated for the production of fruit.

As regards time of planting, &c., local conditions must be consulted before deciding these points, but the object should be as far possible to secure for the plant an early start and a long season, in order to successfully mature its fruit and enable the crop to be gathered in good condition.—*Agricultural Magazine*, Ceylon.

COTTON-GROWING IN THE WEST INDIES.

Cotton, at one time a staple product of the West Indies, has been almost entirely supplanted by the sugar-cane, and is now grown on a commercial scale only at Carriacou. The Imperial Department of Agriculture has recently been conducting experiments with a view of testing the possibility of re-establishing a cotton industry at St. Lucia and Montserrat. Samples of cotton grown in these islands were forwarded to the Manchester Chamber of Commerce in March last. The experts to whom they were submitted for examination report:—

We should value them as undernoted, though it would be advisable to take the values as more or less nominal, there having been no actual business in these descriptions of cotton for some time past. Most of the qualities, however, would fairly readily find buyers. Cotton of white colour is preferred to yellow cotton, and commands a higher price—

Sea Island	$7\frac{1}{2}$d.	Hawkins Prolific ...	$4\frac{5}{8}$d.-$4\frac{3}{4}$d.
King Improved ...	$4\frac{3}{4}$d.-5d.	Native Montserrat ...	$5\frac{3}{4}$d.-6d.
Upland	6d.	Native Cotton (St. Lucia)	$4\frac{1}{2}$d.-$4\frac{3}{4}$d.
Peterkin	$4\frac{1}{2}$d.		

We think with regard to the Sea Island that this might easily fetch considerably more money.

COTTON-GROWING WITHIN THE EMPIRE.

A meeting of representatives of the Lancashire cotton industry was held yesterday (says the *Bolton Guardian* of 13th June) at the Chamber of Commerce rooms, Manchester, the meeting having been convened at the instance of the association which has for its objects the growth of cotton within the

Empire. Mr. J. E. Newton (vice-president of the Oldham Chamber of Commerce) presided, and there was a large attendance of prominent spinners and manufacturers. A resolution agreeing to form a guarantee fund of £50,000 for facilitating the growth of cotton was adopted. In the discussion which followed it was felt that the inquiry should be on the widest possible basis. Mr. John Thomson, president of the Manchester Chamber of Commerce, promised £250 as a donation to the project, and Sir George Colton said he would give the same. Financial help was also promised from Liverpool. On behalf of the cotton operatives, Mr. Thomas Ashton, J P., said they would give the project every possible support. What they wanted was a better supply of cotton, so that they should not have to depend on the success or failure of the American crop. Mr. Ashton stated that in one district alone it cost the Operatives' Society between £10,000 and £15,000 a year to pay for the stoppages necessary through the shortness of cotton.

INTERESTING TO COTTON-GROWERS.

The following letter, written to the *Manchester Courier* (England), should act as a strong incentive to farmers in all parts of Queensland to add cotton-growing to their ordinary cultivation. It does not follow that farmers should throw up everything else and devote all their energies to cultivating cotton. On the contrary, the crisis in the cotton-spinning industry simply enables them to add another valuable string to their bow, with every prospect of making a fair profit in addition to that made on sugar, coffee, wheat, &c.

The letter is headed:—

BRITISH COTTON-GROWING.

(To the Editor of the "Manchester Courier.")

Sir,—The meeting convened last week at the Manchester Chamber of Commerce was not held one minute too soon. With those who are interested in the cotton industry and watching its vicissitudes, there can be no two opinions as to its present unsatisfactory position and future serious outlook. Put briefly, the increase of spindles throughout the world has more than overtaken the world's supply of the raw material. As a director of one spinning-mill and a shareholder in more than a score of others, all of which are financially strong and up-to-date, I can safely affirm that at the present moment it is impossible for a cotton-spinner to make a profit, and difficult not to work to a loss. In other words, the "margin" between cotton and yarn has completely vanished. The price of cotton (middling) which, about two years ago stood at 3⅛d., reached 6d. a year since, and now stands at about 5⅛d., with several months in front of us before the advent of a new crop—notwithstanding concerted action in running short time, and in spite of this year's supplies probably reaching 10,500,000 bales, or a little more than last year. As to prospects of relief in the near future, they are but faint, for the highest authorities and statisticians have already concluded that the American acreage planted for next year is about 27,000,000, or certainly not more than the current year, and yet cotton-mills in Great Britain, in the United States, and elsewhere are increasing at an alarming rate. The tension, therefore, is likely to continue, and possibly become more acute unless there be some way of escape. Clearly, it is to shake ourselves loose from the grip in which we are so firmly held by the American planter, who, roundly speaking, grows as much and more cotton than the remainder of the world, and supplies more than four-fifths of our own requirements. Besides, what guarantee have we that some fine morning we may not wake up, in these days of "combines," to find that a handful of millionaires have coolly taken over the entire manipulation of this commodity, the value of which, to us in Lancashire, is simply immeasurable, and which is, in fact, our very "bread and butter." From such an appalling catastrophe the Lancashire cotton industry ought, without a moment's delay, to take steps for its protection. With this object in view the association alluded to has been formed.

This brings me to ask the pertinent question, Is the association starting on right lines? I fear not; hence this letter. The promoters are evidently in earnest and mean work, but the danger, it seems to me, is (to retain the metaphor) that the lines upon which they are starting may run the association on to a "siding," where it may

"stick." There is too much of the nature of investment about it, of raising capital and a guarantee fund to be spent in buying land and growing cotton, rather than in devoting its energies and influence to the promoting of the growth of cotton in all portions of the cotton belt by persuading and encouraging others to do the growing. The £50,000 asked for, to be spread over five years, will not go very far in purchasing land and converting the same into cotton plantations. I can picture the company at the end of that time, or perhaps before, fixed up with a few small estates here and there, producing a few hundred bales and their funds exhausted. In that case it would probably drift from the original objects of the association and would become narrowed down to a purely commercial company whose energies and interests would gradually be centred in the success of its own investments. Talking with my cotton friends and experts, we would have preferred the scheme to have taken this shape: The formation of a powerful committee, to be called "the committee for promoting cotton-growing," this committee to be thoroughly representative of all the various sections of the Lancashire trade. Its business would be to put itself into friendly communication with all the consuls and official representatives of Great Britain wherever the climate was suitable for the growing of cotton, and inviting their sympathy and influence and aid. Where necessary, it would bring pressure to bear, either through the British Government or otherwise, to encourage the planting of a few acres for the growing of samples as a beginning. In regard to our own foreign possessions and colonies, it is possible that Government subsidies would be forthcoming. This committee would require no capital or guarantee fund, and would enter upon no land or commercial speculations, but would expect every firm in Lancashire of any position to become a subscriber, say, of £1 1s. per annum. By this means a large annual income would be secured, an energetic secretary with one or two clerks could be engaged, and a short monthly report could be sent out to subscribers. Such report would be interesting as containing information, correspondence, and news from the different regions of the world, and as reporting the progress and work of the committee. Conducted on such lines, it does seem to some of us that such a committee would speedily place us, and keep us, in touch with a new cotton world.—Yours, &c.,

JOHN HARPER.

Alderley Edge, 16th June, 1902.

GUTTA-PERCHA IN NEW GUINEA.

Mr. Deakin, Acting Minister for External Affairs, has, through the British Ambassador at Berlin and the British Foreign Office, received an interesting report giving the results of an expedition under Herr Schelter, which has been exploring in German New Guinea. The expedition, when travelling from Shephausart to the Bismarck Mountains, made valuable discoveries of gutta-percha and indiarubber. The *National Zeitung* describes the discoveries as of the utmost importance to the future of New Guinea. Mr. Deakin explains that as the boundary between British and German New Guinea is purely artificial, the probabilities are that similar discoveries will be made in British territory.

TESTING CANE JUICE.

Mr. E. Bourguelot recommends as a test for the presence of cane sugar the use of the invertin of yeast, which doubles cane sugar. It has the same effect also on gentianose and raffinose, and these carbohydrates are rare in plants. By these means he has determined the presence of cane sugar in the rhizome of *Scrophularia nodosa*, in the succulent pericarp of *Cocos yatai* (25 gm. per kilo), and in the horny endosperm of *Asparagus officinalis* (15 gm. per kilo). In neither of the two latter plants was the reaction with emulsion obtained showing the absence in these organs of a glucoside which is doubled by that ferment, *Comptes Rendus.*

Horticulture

LIFTING DAFFODILS.

It is only those varieties of Narcissi or Daffodils which produce offsets freely that may be lifted annually, and even with these it is not absolutely necessary. What is meant by the annual lifting and drying encouraging increase is that by this means it is possible so to separate and plant the offsets that the stock is increased more quickly. To dry bulbs of Narcissi in general after lifting them is not good practice, especially if they are kept some weeks out of the ground. They should be lifted, divided, and replanted at once. The fact that your small offsets dried up shows that drying and keeping small bulbs out of the ground is not advisable, nor is the separating and planting of very small offsets according to the variety to be recommended.

A BLUE ROSE

grown by a head gardener, named Macdonald, in the United States, has been sent to Kew Gardens. As a rarity it may claim rank with the choicest new orchid, and it is therefore not surprising to learn that on the way over the Atlantic it received the most careful attention, and was protected in a specially constructed miniature greenhouse—a care which was rewarded by its arrival with blooms in excellent condition.—*B Weekly*, 26th June.

WATERING PLANTS WITH HOT WATER.

So long ago as 1855 attention was drawn to the use of hot water for watering plants in a German publication entitled "Gartenflora."

Roses, palms, ficuses, fruit trees in pots, and other plants were experimented upon with great success. The plants, at one time vigorous, had sickened and developed certain signs of approaching death. The young leaves were limp, and the others were spotted with numerous black areas. The surface of the soil was scarified, and then copiously watered with water at the high temperature of 144 degrees Fahr. The water was applied until it ran out in abundance from the hole at the bottom of the pot. The water which first came through was perfectly clear, but later it was appreciably coloured brown. After this washing or irrigation the plants were placed into a warmer situation, and the following day the young leaves had pricked up, the ugly spots had ceased to grow, and three days later the two ficuses were restored to their pristine health. The plants soon threw out a large number of new roots and grew vigorously.

Recently a distinguished Belgian horticulturist has been interesting himself in experiments on clivias, palms, aspidistras, dracænas, primulas, begonias, and other plants, using water heated to about 125-130 degrees Fahr. His summarised comment is :—"We do not know how we can sufficiently recommend this practice, either as a curative or a preventive method." During the winter is perhaps the best time to adopt the hot-water treatment by amateurs, and those having plants in dwelling-rooms. It is a matter of common knowledge that soil enclosed in a pot in which a plant is growing ultimately becomes sour, and has, indeed, a certain poisonous quality. This toxicity is due to the presence of organic acids in excess, and which in the ordinary open ground conditions would have been removed by bottom drainage. Plants growing in pots are under distinctly artificial conditions, and there are many causes which lead to the accumulation of these toxic acids. For instance, too deep planting, or when the

roots are not sufficiently ærated, the use of over-hard baked pots or glazed receptacles, the compacting of the soil, and particularly the absence of or clogging of the drainage. Naturally this accumulation results in the burning of the young root tips. Activity is reduced, and the whole system of the plant suffers from the shock.

The editor of the *Garden and Field* suggests that, after the plant has been treated to the hot-water bath, it would be well to replace the loss of food elements by slight applications of liquid manure; nitrate of soda in mild doses may be used for all foliage plants in pots, but that, of course, is not a complete fertiliser, and must be supplemented by phosphoric acid and potash. Some plants are much less able to accept chemical food than others; generally speaking, palms and ferns require careful handling, but the ordinary rules of gardening practice will govern the operator. It is reasonable to believe that if the hot water will dissolve and wash out the poisonous acids it would also dissolve and carry off all essential elements of plant food. Therefore, they must be supplied artificially.

HISTORY OF THE MELBOURNE BOTANIC GARDENS.

We have received from the director of the Melbourne Botanic Gardens, Mr. W. R. Guilfoyle, a little pamphlet giving in concise form the history of the gardens from the year 1845, together with the names of the various gentlemen who have held the office of director. A very excellent view of a portion of the gardens forms the frontispiece, and gives a good idea of their extent and beauty. Two plans are also attached, one showing the plan of the gardens on the retirement of Baron Von Mueller in 1873, the other showing the alterations and improvements effected since that date by Mr. Guilfoyle. Both are very well executed, and with the help of the remarks as to the route map and index, any object of interest to the visitor can be easily found. The pamphlet, small as it is, supplies all information as to routes from the city by trams and vehicles, and the times of opening and closing. The regulations for the care, protection, and management of the gardens are also published. This little work should be of great value to visitors to the southern capital.

NUMBER OF PLANTS PER ACRE.

The number of plants to the acre depends on the distance apart, and whether set to form squares or equivalent triangles. The following table may be useful:—

Apart.	Square.	Triangle.	Apart.	Square.	Triangle.
1 foot	43,650	50,300	12 feet	302	348
2 feet	10,890	12,575	14 „	222	256
3 „	4,840	5,889	15 „	193	222
4 „	2,722	3,143	16 „	170	191
5 „	1,742	2,011	18 „	134	164
6 „	1,210	4,397	20 „	109	125
7 „	888	1,025	25 „	69	79
8 „	980	785	30 „	48	55
9 „	537	620	35 „	35	40
10 „	435	502	40 „	27	31

When the distances between the plants differ from that between the rows, divide 43,560, the number of square feet in an acre, by the number of square feet to each plant, and the quotient will be the number of plants to the acre. The square feet to each hill is found by multiplying the number of feet between the rows by the number of feet, or fraction of a foot, between the plants.

Forestry.

FORESTRY ON THE DAINTREE.

We are indebted to our old friend Mr. Theodore Pentzcke for the following ideas on forest conservancy. He deprecates selfishness in the matter of planting trees which will not be available for the mill for sixty or eighty years, saying that we of the present generation have for years been busy felling and using trees which we did not plant, reaping where we did not sow, and that we should as a duty plant for our successors. We once told the little story in this *Journal* of the old octogenarian German farmer who was planting an orchard of young cherry-trees. On being asked why he could be so foolish as to plant trees of which he could not possibly hope to enjoy the fruit, he replied:—"I may not live to enjoy it, but my descendants will, and they will bless the hand which planted them."

In like manner Mr. Pentzcke considers we should act for the benefit of our descendants, and both plant and conserve existing timber trees. The cedar-tree of Queensland only arrives at maturity after ninety years, and, on account of its tender wood, requires some shelter from other timber. He suggests, therefore, that some substantial valuable timber trees should be planted with cedars, and considers that teak would be the most valuable. Teak returns a crop of poles after thirty years. In sixty years they form fair-sized trees suitable for the sawmill, by which time some of the cedars will be ready for cutting. In ninety years the teak will girth 6 feet and the cedar 10 feet. Then both can be cut, and the forest will still be renewing itself. The fact that the timber crop cannot be harvested in our time should not deter us from planting. Teak should be planted in belts outside the cedar, of which forty may be planted per acre, in good scrub land, still covered with undergrowth to preserve the humus so easily lost by the washing away caused by the drenching Northern rains. If the land at some distant date is required for the cultivation of sugar, rice, coffee, or bananas, the timber would pay heavy interest on the purchase money, and when finally harvested would yield compound interest—a splendid legacy for a man's descendants. If cedar is cut before it is sixty years old it is worthless. Many timbers are at maturity at twenty years, but they are equally worthless. Pines are best planted in groups—not mixed with other trees. The so-called scrub ironbark, however, is an excellent, durable, quick-growing timber. It is a stately tree, very resinous, and, when young, is easily recognised by its variegated bark. This tree Mr. Pentzcke has always named (perhaps wrongly) *Araucaria excelsa.* Most of the scrubs contain the Grevillea, but the best of all are the *Flindersia excelsa,* the ash, the silkwood. These would mix well with bamboo and *dendrocalamus* (also a species of bamboo). When he was collecting plants and seeds for the late Government Botanist of Victoria, Baron Ferd. v. Mueller, it transpired that the Daintree timbers correspond to a great extent with those of the Malay Peninsula and the East Indies. It may safely be said that the number of different kinds of timber here varies by more than 100 per cent. than those of Europe. He considers that our *Flindersia excelsa* is on a par with the best mahogany, and it is a pity it is not better known. It differs from the latter in colour, but is tougher, more elastic, and lighter, which are excellent qualities. The timber was formerly much used for making casks. Beef casks made of it and sent to England were eagerly bought up by wine merchants, the staves being split from the quarter, exhibiting the pea grain (silver grain) with flecks of horny scales which are very large. The timber is more airtight than any other known timber, and the volatile aromatic oil is thus prevented from evaporating. The aroma remains with the wine, which is thus in better condition when cellared to increase in the wine the noble much-prized taste and smell.

FOREST CONSERVANCY.

Every State in the Australian Commonwealth is slowly awaking to the importance of the duty of working the forests of the continent so that its enormous timber wealth may not only return better revenues to the public exchequer in our own time, but may be handed on as a rich legacy to posterity.

The following paper by Mr. Philip Mac Mahon, Director of the Government Botanic Gardens, will be read with interest.

Mr. Mac Mahon also occupies the position of lecturer on forestry to the Queensland Agricultural College, and reports of his lectures on this important subject will appear in the *Journal* in due course.

A Plea for Common Sense Forest Management.

[By Philip Mac Mahon, Director Government Botanic Gardens, Brisbane.]

The cause of forest conservancy, like many another good cause, has suffered no less from the injudicious advocacy of its friends than from the opposition and contempt of its enemies.

Very often those who saw, or thought they saw, in our rapidly diminishing forests a grave national danger, none the less alarming because insidious, cried shame on the hardy and industrious pioneer and his aiders and abettors, denounced the enterprising squatter and selector, and shriekingly demanded all sorts of unworkable restrictions for the preservation of the tree-growth of the country.

They took up, in too many instances, the position of that farmer who was so enamoured with his beautiful crop of wheat that he refused to allow it to be reaped till the winds and rains had destroyed it.

These advocates of forest conservancy naturally fail to secure the sympathy and practical co-operation of those who usually hold the reins of power, men who from the very nature of their training are accustomed to look at matters of this kind from all four sides, and whose interest it is to ignore the wailings of Tom, if the restrictions he demands appear inimical to the welfare of his two neighbours, Dick and Harry.

The evils of injudicious ringbarking, often on land unsuitable for grazing, indiscriminate felling of immature timber, wasteful methods of lumbering, utter absence of any really comprehensive grasp of the principles of systematic sylviculture, the ludicrous disproportion between the paltry State revenues derived from the forests and the, in some instances, comparatively huge expense of collecting these revenues and administering an unscientific, vacillating, and useless forest policy, furnish the friends of forest conservancy with texts upon which the changes can be rung for ever, and upon which any man of intelligence, with a taste for such research, can write a small library.

George R. Marsh, in his learned work, "Man and Nature," published in 1864, states the evidence and conclusions from this point of view in 200 pages of lucid exposition and reasoning, which will repay the closest study.

On the other hand, the opponents of forest conservancy point to the paramount needs of settlement, the necessity for a cheap and abundant supply of firewood and timber for construction purposes, the claims of the wage-earners employed in the business of lumbering, and the expense involved in forest control. They deny that there is likely to be any appreciable diminution in the timber supply, that forests exercise the influence over climate that is claimed for them, and that they act as regulators of local climatic conditions, mitigating the effects of floods and droughts.

But these latter contentions are made in a somewhat half-hearted manner, and in answer to what they allege to be the extravagant claims of the advocates for a stringent system of conservancy.

Huxley, in one of his very happiest phrases, has defined science to be trained common sense, and the trained forester attaches due weight to each of the above arguments, and if he has had experience in countries where forestry is a money-making business, and not a money-squandering theory, he cannot for the life of him see why the forests cannot be perpetuated as vast sources of perennial timber supply of increasing value, giving every year a new employment to the wage-earning classes, increased incomes to the sawmillers and timber merchants, a larger revenue to the State, and contributing to the general prosperity.

The problem before the Forest Conservator in Australia is not an easy one, but it is not by any means impossible of solution. A careful perusal of the "Indian Forest Act," as modified up to 1890, "The Indian Forest Department Code," with its appendices, and Baden-Powell's "Forest Law," will show the enormous difficulties arising from immemorial rights and easements, local customs, climatic influences,

difficulties of transport, and other causes not excepting political influence, which had to be faced and conquered by the men who in less than fifty years laid the foundations and erected the superstructure of the system of Indian forestry, which has elicited the admiration of the world. Dr. Schlich, writing in 1889, and pointing out that the average annual net revenue of the period comprised between the years 1864 to 1867 was £106,615, and the average net annual revenue for the period comprised between the years 1882 to 1887 was £384,752, goes on to say:—"The annual net revenue during the period 1882-1887 was four times that of the period 1864-67, and the increase is going on with undiminished rapidity. There is little doubt, if any, that twenty-five years hence the net surplus will be four times the present amount if the Government of India perseveres in its forest policy as developed in the past. Indeed, it would not be going too far to say that the increasing forest revenue bids fair to become a substantial set-off against the expected loss of the opium revenue—a loss which may occur some day. This is the legacy left to the Treasury of the Indian Empire by the men who directed its forest policy during the last twenty-five years."

A reference to the report of the Inspector-General of Forests for British India, 1899-1900, shows that this prophesy of Dr. Schlich is in a fair way of being realised thus:—1886-7, gross revenue 10,678,807 rupees, expenditure 6,831,284 rupees, proportion of expenditure to gross revenue 64 per cent.; 1899-1900, gross revenue 19,009,610 rupees, expenditure 11,024,680 rupees, proportion of expenditure to gross revenue 58 per cent., an increase of 8,330,803 rupees in gross revenue and a decrease of 6 per cent. on the expenditure as compared with the revenue. The net profit on the Indian forests in 1899-1900 was £532,329, as against £191,484 in 1875-6, twenty-five years previously.

In 1894, the Government of India formulated a resolution for the guidance of the Forestry Department, and the information of the public. This document is a declaration of the forest policy of the Indian Government, and deserves the closest study by every Australian legislator who takes an interest in this important question. The following extracts are of general interest:—

"The sole object with which the State forests are administered is the public benefit. In some cases the public to be benefited are the whole body of taxpayers, in others the people of the tract within which the forest is situated; but in almost all cases the constitution and preservation of a forest involve, in greater or less degree, the regulation of rights and the restriction of privileges of user in the forest area, which may have previously been enjoyed by the inhabitants of its immediate neighbourhood. This regulation and restriction are justified only when the advantage to be gained by the public is great, and the cardinal principle to be observed is that the rights and privileges of individuals must be limited, otherwise than for their own benefit, only in such degree as is absolutely necessary to secure that advantage."

This declaration of general policy seems cast on broad and liberal views. The resolution continues:—

"The forests of India, being State property, may be broadly classed under the following heads:—

(*a*) Forests the preservation of which is essential on climatic or physical grounds.

(*b*) Forests which afford a supply of valuable timbers for commercial purposes.

(*c*) Minor forests.

(*d*) Pasture lands."

* * * * * *

"The first class of forests are generally situate on hill slopes, where the preservation of such vegetation as exists, or the encouragement of further growth is essential to the protection from the devastating action of hill torrents of the cultivated places that lie below them.

"Here the interests to be protected are important beyond all comparison with the interests which it may be necessary to restrict, and so long as there is reasonable hope of the restriction being effectual, the lesser interests must not be allowed to stand in the way."

* * * * * *

"It should also be remembered that subject to certain conditions, to be referred to presently, the claims of cultivation are stronger than the claims of forest preservation. The pressure of the population upon the soil is one of the greatest difficulties that India has to face, and that application of the soil must generally be preferred which will support the largest numbers in proportion to the area. Accordingly, whenever a demand for culturable land exists, and can only be supplied from forest areas, the

land should voluntarily be relinquished without hesitation; and if this principle applies to the valuable class of forests under consideration, it applies *a fortiori* to the less valuable classes which are presently to be discussed. When cultivation has been established it will generally be advisable to disforest the newly-settled area. But it should be distinctly understood that there is nothing in the Forest Act, or in any rules or orders now in force, which limits the discretion of local governments without previous reference to the Government of India (though, of course, always subject to the control of that Government) in diverting forest land to agricultural purposes, even though that land may have been declared Reserved Forest under the Act."

Place this solemn declaration of policy side by side with the facts that British India has only 950,000 square miles of territory for 231,000,000 people, and that the Australian Commonwealth has 3,000,000 square miles for 4,500,000 people, and the supposed difficulties of forest conservancy in Australia will appear in a very ludicrous light.

No Australian statesman can have any greater desire for the extension of land settlement than is here declared to be the settled policy of the country which has reduced the exact type of forest conservancy, which is adaptable to this continent, to a science.

The conditions which govern the business of forestry in India and in Australia are identical in most essential points.

When some years ago I resided in India, and was engaged in collecting information on forestry matters, and investigating the operations of working plans framed under the Burmah Forest Act of 1881, I had ample opportunities of investigating the forest condition of an immense territory. I did so with the advantage of an experience of European forestry from my childhood, supplemented by a training at the Royal Gardens, Kew. During a fourteen years' residence in Australia, during which time I have paid unremitting attention to forestry problems, my opinion that the Indian system is the one suited to Australian conditions has become strengthened every day.

During a visit which Mr. Bibbentrop, the Inspector-General of Forests in India, paid to Australia seven years ago, he suggested the regulations and working plans framed under the Burmah Forest Act as those most suited for Victoria, and this applies with greater force to New South Wales and Queensland. Recently in Victoria a prominent statesman is reported to have declared that a person who has been accustomed to Indian forestry would be of no service in Victoria. Mr. Bibbentrop regarded it as highly important that an officer from Victoria should be deputed to study for a year or two in India the forests and forest methods of that country. Those acquainted with Mr. Bibbentrop's work, "Forestry in British India," will find much interest in comparing it with portions of the fourteenth report of the Royal Commission on State Forests, Melbourne, 1901.

It would probably surprise the objector to Indian methods to learn that the most nearly perfect or normal forests in the world are of eucalyptus, and that they are not in Australia but in India, and that if the Australian forester wishes to see perfectly managed plantations of Australian gums he must go to the Nilgiris.

One feature which the forests of Australia possess in a remarkable degree, much more than in India, is the property of natural reproduction within certain limits. The great groundwork of Indian forest methods is the taking advantage of and encouraging the natural regenerating tendency of the forests. Of £734,992 expended on forest work in India in 1899-1900, only £8,355 was expended on regular plantations and artificial reafforesting, and £2,333 on cultural operations.

But a knowledge of cultural conditions is regarded as essential to successful forestry in all countries where it is expected that forestry shall be understood to mean the management of growing timber crops in such a way as to secure their perpetuity while obtaining the maximum possible annual output of mature and marketable timber. It is for this reason that students entering Cooper's Hill College for the Indian forest service are required to study botany, physics, and forest engineering, and to make full use of the botanical laboratory, forestry museum, and forest nursery attached to that institution.

Referring to this point, the Royal Commission on State Forests in Victoria (1901) in their report say:—"The Conservator should be responsible for the management and working of the reserves, and for the efficiency and proper performance of duty of the forests staff His duties should embrace those of a general inspector, and on all technical questions of management and working practice he should have full control.

He should also be responsible for the proper training of the younger members of the staff, and for the establishment of regular courses of instruction in theoretical and practical forestry."

From time to time the Imperial Government has sounded a note of alarm as to the rapidly diminishing supplies of timber in the British dependencies outside of India, as witness the following despatch from the Secretary of State for the Colonies to the Officer Administering the Government of Queensland:—

Downing street,
24th February, 1880.

Sir,—In my circular despatch of the 28th of March of last year, I called attention to a paper which had been recently presented to Parliament containing a digest of the information which my predecessor had obtained as to the timber resources of the colonies.

2. In answer to that circular, I have received several applications for information as to the laws and regulations existing in those colonies in which measures have been taken for the conservation of their forests, and, with a view of supplying such information in a clear and compendious form, I have been in communication with Mr. Julian Rogers, the Secretary of the Institution of Surveyors, by whom a digest of the information respecting colonial timber was prepared.

3. I have now the honour to transmit for the information of your Government a copy of a letter in which Mr. Rogers has stated the principles which, in his opinion, should govern legislation in reference to the preservation and re-establishment of forests, together with a copy of a paper, which he has been good enough to draw up, containing copies and extracts from the Colonial Acts, which he considers most generally suitable for adoption.

4. I have already in my circular despatch of the 28th March recommended the question of forest conservation to the attention of your Government; but, as I observe in the reports which have been furnished to this Department upon the subject that there is a general tendency to under-estimate the importance of local action, in the expectation that an unlimited supply of timber will always be obtainable from other sources, whereas on reference to the digest of information respecting colonial timber it will be seen that out of the thirty-eight colonies referred to therein, there are only four in which the timber is not diminishing, and in many cases rapidly diminishing, and without any steps being taken for replanting or preventing waste, I feel that it is only right that I should again press the subject upon the consideration of your Government as one of great and growing importance, and in which in many cases the health and prosperity of the colonies is very deeply concerned.

I have, &c.,

M. C. HICKS-BEACH.

If at some time in the near future the Commonwealth Parliament, having regard to the considerations expressed in this important despatch, decides to establish under section 51 of the Constitution Act a business-like and scientific forest department, it cannot be urged in opposition that any source of revenue will be interfered with, because in most cases the expenditure exceeds the income.

The common sense method of working forests is the working plan method prescribed by the Indian Forest Code. The working plan report should specify all particulars relative to the forest, its condition, and proposals for its future management under the following heads prescribed in the Indian Code:—

Summary of Facts on which Proposals are Based.

(*A.*) Description of land. (1) Name and situation. (2) Configuration of ground. (3) Underlying rock and soil. (4) Climate. (5) Agricultural customs and wants of population.

(*B.*) Composition and condition of the forest. (1) Distribution and area. (2) State of the boundaries. (3) Legal position. (4) Rights. (5) Composition and condition of the crop. (6) Injuries to which the crop is liable.

(*C.*) System of management. (1) Past and present systems of management. (2) Special works of improvement undertaken. (3) Past revenue and expenditure.

(*D.*) Realisation of the produce. (1) Marketable products; quantities consumed in past years. (2) Lines of export. (3) Markets. (4) Mode of extraction and its cost. (5) Net value of each class of produce.

(*E.*) Miscellaneous facts. (1) The forest staff. (2) Labour supply.

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED.

(*F.*) Basis of proposals. (1) Working circles how composed; reasons for their formation. (2) Compartments; justification of the subdivisions adopted. (3) Analysis of the crop; method of valuation employed.

(*G.*) Method of treatment. (1) Object sought to be obtained. (2) Method of treatment adopted. (3) Exploitable age.

(*H.*) The fellings. (1) The general working scheme; calculation of the possibility. (2) Period for which the fellings are prescribed. (3) Areas to be felled annually or periodically; order of their allotment. (4) Nature of and mode of executing the fellings; forecast of the condition of crops at their conclusion. (5) Tabular statement of the fellings to be made.

(*I.*) Supplementary regulations. (1) Cleanings, thinnings, or other improvement fellings. (2) Grazing and other rights. (3) Sowings, plantings, or other works special to each circle. (4) Improvements common to the whole area.

(*J.*) Miscellaneous. (1) Miscellaneous prescriptions. (2) Changes proposed in the forest staff. (3) Financial results of proposed working.

(*K.*) Appendices. (1) Maps. (2) Description of crop in each compartment, written or by stock maps. (3) Valuation surveys; written record of the results of. (4) Rates of growth; records of observations made. (5) A concise summary (by working circles) of the prescriptions of the plan. (6) Miscellaneous statements.

"With a view to bringing all important forests, as soon as possible, under systematic management, the first working plans may be of a simpler description, and based on such data as may be readily obtainable, to be substituted by more accurate plans as to the detailed information required for their preparation becomes available." (Indian Code.)

When the working plan is approved by the Government or, as in the case of railway schedules, by Parliament, it should only be set aside by an Act of Parliament.

It will be seen from the above necessarily brief sketch that forest conservancy is a business which, to succeed, must be conducted on regularly formulated and business lines, and by persons whose business it is.

The voluminous information collected from many works by Royal Commissions, Conferences, and the like, has a value which is by no means to be deprecated. It is most useful as educating the public and public men as to the necessity for action, and, what is of more importance, as to the fact that action will pay. But it must not be regarded as taking the place of practical action, and there is a danger that the voluminous nature of the evidence and the great expense of printing, fees, travelling expenses, &c., involved in its collection, may defeat the very object of its collectors.

The assistance which the science of forestry derives from the science of meteorology, and the advantages I have derived in my study of Australian climatic conditions, from a long association with Mr. Wragge, both as the observer of one of his branch-meteorological stations and his personal friend, and the strong views he has always expressed as to the advantages of forests from a climatic standpoint, render it appropriate that I should agree to his request to say a few words on my favourite pursuit and study in the pages of his new and journalistic venture, to which I wish a career as prosperous as it is certain to be useful.

I may be allowed, in conclusion, to quote the words of one of the most brilliant scientists, economists, and financiers of our day, Sir John Lubbock: "The reckless and wanton destruction of forests have ruined some of the richest countries on earth. Syria and Asia Minor, Palestine, and the North of Africa were once far more populous than they are at present. They were once lands 'flowing with milk and honey,' according to the picturesque language of the Bible, but are now in many places reduced to dust and ashes. Why is there this melancholy change? Why have deserts replaced cities? It is mainly owing to the ruthless destruction of the trees which has involved that of nations. Even nearer home a similar process may be witnessed. The French Departments, the Hautes and Basses-Alpes, are being gradually reduced to ruin by the destruction of the forests, cultivation is diminishing, vineyards are being washed away, the towns are threatened, the population is dwindling, and unless something is done the country will be reduced to a desert." Again: "The region of the Landes, which fifty years ago was one of the poorest and most miserable in France, has now been made one of the most prosperous owing to the planting of pines. The increased value is estimated at no less than 1,000,000,000 francs."

Only a month ago Dr. Maxwell complained that the injudicious cutting of forest on hill slopes of little value for cultural purposes was seriously affecting the sugar industry in Queensland.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table Showing the Total Rainfall for each Month of the Year in the Agricultural Districts of Queensland.

Stations.	1901.					1902.							
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.
North.													
Bowen	6·36	0·18	0·93	0·92	0·71	0·19	2·19	2·01	0·68	Nil.	0·44	0·11	0·02
Cairns	2·53	1·82	2·34	5·23	2·78	3·79	12·90	11·43	3·48	2·34	4·97	3·87	0·95
Geraldton	11·77	3·37	3·85	6·45	1·60	3·78	16·87	7·55	12·83	5·39	8·10	7·32	1·77
Herberton	2·53	1·04	4·92	1·13	1·30	0·57	5·77	3·86	1·54	1·07	1·58	2·05	0·08
Hughenden	0·33	Nil.	0·31	0·29	1·43	1·57	2·02	0·53	*	Nil.	Nil.	Nil.	Nil.
Kamerunga	1·94	1·72	1·19	5·74	2·16	2·58	10·59	14·24	3·40	2·63	5·12	4·00	0·81
Longreach	0·37	0·58	Nil.	Nil.	1·71	0·87	0·27	0·18	0·03	0·03	Nil.	Nil.	0·05
Lucinda	5·89	0·30	2·59	Nil.	0·32	3·55	11·38	2·67	1·78	*	0·63	0·21	0·45
Mackay	5·14	2·29	1·35	1·85	0·71	3·78	8·43	4·41	6·73	1·26	2·33	0·59	0·80
Rockhampton	3·04	1·78	0·51	0·41	0·19	4·79	1·36	1·68	0·21	Nil.	Nil.	Nil.	0·09
Townsville	1·87	0·14	0·90	0·16	0·61	2·21	3·14	1·61	0·35	0·04	0·10	Nil.	0·10
South.													
Barcaldine	0·25	0·51	0·54	0·55	0·09	2·39	0·07	0·37	0·02	Nil.	Nil.	Nil.	0·08
Beenleigh	4·49	0·70	3·35	1·35	0·14	2·41	1·82	0·68	0·42	Nil.	0·11	0·62	0·49
Biggenden	2·81	2·11	1·35	0·47	0·92	2·12	0·83	1·80	0·65	Nil.	0·04	0·08	0·04
Blackall	0·44	0·88	0·60	0·97	0·32	1·68	0·34	0·34	0·05	Nil.	0·01	0·01	0·21
Brisbane	3·71	1·30	3·25	1·41	0·75	1·38	2·67	0·76	0·17	0·47	0·06	0·55	0·98
Bundaberg	5·59	1·60	2·18	1·28	Nil.	6·33	0·75	1·99	0·43	0·02	Nil.	0·07	0·13
Caboolture	3·18	1·55	5·01	3·17	3·45	2·29	2·66	1·29	1·99	Nil.	0·03	0·20	0·05
Charleville	0·92	0·32	0·04	0·65	0·96	0·47	0·22	0·42	0·23	Nil.	0·12	Nil.	1·04
Dalby	1·66	1·11	4·09	0·15	0·42	1·65	0·20	0·30	2·00	Nil.	0·15	Nil.	0·41
Emerald	1·74	1·11	Nil.	0·09	0·63	3·28	1·11	0·97	0·30	Nil.	0·01	Nil.	Nil.
Esk	3·03	1·72	4·67	1·08	2·20	1·81	1·06	0·75	1·25	Nil.	0·04	0·25	0·15
Gatton College ...	3·23	1·06	3·02	0·86	0·26	2·27	1·58	0·26	*	0·04	0·03	0·04	0·64
Gayndah	Nil.	1·91	2·39	0·04	0·38	2·54	0·51	0·99	0·81	0·29	Nil.	Nil.	0·05
Gindie	1·77	1·81	0·53	0·02	0·57	1·35	1·46	0·78	0·47	Nil.	Nil.	Nil.	Nil.
Goondiwindi	1·55	0·67	2·83	0·21	0·20	2·06	0·75	1·20	0·06	0·02	0·41	Nil.	1·19
Gympie	3·39	1·34	1·91	1·34	1·25	1·49	1·65	2·33	1·09	0·23	Nil.	0·36	0·94
Ipswich	2·47	3·54	3·98	1·17	0·35	1·45	2·80	0·32	0·03	0·02	0·15	0·31	0·77
Laidley	5·32	1·22	3·37	1·10	1·65	1·79	1·94	0·39	0·10	0·20	0·06	Nil.	0·40
Maryborough	5·02	1·05	1·54	1·84	1·54	1·29	0·75	0·93	1·57	0·36	0·24	0·29	0·57
Nambour	4·42	0·98	3·89	2·85	3·89	1·30	2·06	1·61	†	0·26	0·04	*	0·70
Nerang	5·41	0·68	4·57	2·70	0·46	3·98	4·54	0·65	0·65	0·35	0·52	1·07	1·22
Roma	0·98	0·43	0·71	0·54	0·83	2·72	1·11	0·54	0·15	Nil.	0·20	Nil.	0·46
Stanthorpe	4·22	1·42	2·93	2·22	1·67	3·17	0·51	0·56	0·10	0·87	0·78	0·15	0·94
Tambo	0·74	1·47	0·51	Nil.	0·16	1·73	0·35	0·68	0·04	Nil.	0·01	Nil.	0·28
Taroom	2·34	2·11	0·92	0·42	0·31	0·53	1·82	1·30	0·33	Nil.	Nil.	Nil.	0·17
Tewantin	4·61	2·71	3·26	1·66	2·70	3·09	1·13	3·44	2·84	0·80	0·91	0·91	0·85
Texas	3·06	1·47	1·47	0·26	0·43	1·95	1·62	0·42	Nil.	Nil.	0·88	Nil.	1·57
Toowoomba	5·57	1·85	4·45	1·10	0·87	3·46	1·20	Nil.	0·79	0·03	0·38	0·19	0·56
Warwick	5·74	2·05	3·12	1·19	0·71	3·48	0·65	0·55	Nil.	0·15	0·63	0·20	0·94
Westbrook	6·30	1·75	2·27	0·59	0·31	3·21	1·04	0·06	0·41	Nil.	0·28	0·06	0·29

* Returns not yet received. † Data unreliable.

CLEMENT L. WRAGGE,
Wragge's Weather Bureau.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

Butter.—Choicest salt Canadian, 98s. to 102s.; finest, 94s. to 96s. Danish, choicest, 106s. to 108s.; finest, 102s. to 104s. No quotations for Australian and New Zealand. Russian butters are making better prices.

Cheese (duty free).—American, 48s. to 49s.; Canadian, 50s.; New Zealand, 50s. to 51s. per cwt.

Condensed Milk.—18s. 6d. to 20s. 6d. per case in 20-case lots.

Sugar (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £14 to £15 per ton; raw, £11 to £15 10s. per ton. German beet, 88 per cent., 6s. per cwt.

Syrups (duty, 2s. per cwt. and ¼ per cent.).—Finest, 14s. to 17s. 6d. per cwt.

Molasses (duty, 2s. per cwt. and ¼ per cent.).—5s. 9d. to 8s. per cwt.

Rice (duty 3d. per cwt.).—Rangoon, £5 10s. 6d. to £6 5s.; Japan, £13 10s. to £14; Java, £15 to £17; Patna, £17 to £21.

Coffee (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 45s. to 100s.; peaberry, 74s. to 120s.; Santos, 27s. to 53s.; Mocha, 60s. to 80s.; Jamaica, finest, 96s. to 120s. per cwt.

Arrowroot.—St. Vincent, 2¾d. to 4½d.; Natal, 5d. to 6¼d.; Bermuda, 1s. 8d. to 1s. 10d. per lb.

Wheat.—Australian, white, 33s.; New Zealand, white, no quotation; Duluth, red, 31s. 6d.; Manitoba, red, 32s. to 33s. 6d. per 480 lb.

Flour.—Australian, 24s. 6d. per 280 lb.

Malting Barley.—English, 33s. per 448 lb.

Oats.—New Zealand, 26s. 6d. to 28s. per 384 lb.; Canadian, 28s. 6d. to 31s. per 320 lb.

Split Peas.—47s. 6d. per 504 lb.

Ginger.—Japan, 31s. to 34s.; Jamaica, 56s. to 63s.; low and common, 35s. to 54s. per cwt.

Pepper.—Capsicums, 16s. to 80s.; chillies, 34s. to 37s. per cwt.

Tobacco.—American. Messrs. Thomas H. Edwards and Co., Liverpool, report as follows on the Tobacco Trade:—

Strips.	1902.	1901.
Western—		
Fillers	— @ 5 @ —	4 @ —
Rather short	5¼ @ 6	5 „ 6
Very middling to middling	6¼ „ 6¾	6¼ „ 7
Good to fine	7 @ 8 @ —	— @ 7¼ @ 8
Burley	6 „ 8½ „ —	5½ „ 8 „ 11
Virginia Dark—		
Fillers	5¼ @ 5¾	4½ @ —
Rather short	6 „ 6¼	5 „ 5½
Very middling to middling	6½ „ 7½	6½ „ 7½
Good to fine	8 „ —	8 @ 9 @ —
Virginia and Carolina Bright—		
Semi-dark	— „ 8	— @ 5½
Semi-bright	8½ @ 9 @ —	5¾ @ 7 @ —
Medium or mixed ...	10 @ 11	8 @ 9
Good to fine	11¼ @ 12½ @ 14	9½ @ 11½ @ 13

Leaf.	1902.	1901.
Western—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade ...	4 @ —	3¼ @ 4
Medium to good trade	4½ „ 6	4½ „ 6
Burley	7 @ 7½ @ 8	6 @ 7½ @ 8
Virginia Dark—		
Common export ...	— @ —	None.
Short trade	— „ —	3½ @ —
Medium trade ...	4 „ 5	4 „ 5
Good to fine trade ...	5½ „ —	5½ „ —
Virginia and Carolina Bright—		
Common or semi-bright	6 „ 7½	4 „ 6
Medium or mixed ...	8½ @ 10 @ —	6½ @ 8 @ —
Good to fine	11 „ 12 „ 15	9½ @ 11 @ 15

Wine.—Australian Burgundy: Wotonga, red, 13s.; Waratah, red, 18s., per dozen bottles. Quart flagons, per dozen, 17s. and 23s. respectively.

Green Fruit.—Oranges, Valencia, from 14s. to 17s. per 420 for common sorts, to 20s. to 22s. for finest selected. Lemons, finest, 28s. to 30s. per case of 420. Bananas, 9s. to 13s. per bunch.

Cotton.—Market in a disturbed state. Quotation, 6d. per lb. for clean Uplands. Queensland farmers will do well to watch the cotton market.

Cotton Seed.—£7 12s. 6d. per ton.

Cotton-seed Oil Cake (decorticated).—£6 5s. to £6 12s. 6d. per ton.

Cotton-seed Oil.—Crude, £21 12s. to £24 5s. per ton.

Linseed.—52s. to 54s. 6d. per 416 lb.

Linseed Oil.—£30 to £30 10s. per ton.

Linseed Oil Cake.—£7 11s. to £7 15s. per ton.

Manilla Hemp.—£25 to £30 per ton.

New Zealand Hemp.—£33 10s. per ton.

Wool.—Prices practically unchanged since previous wool sales.

Frozen Meat.—The following are the latest quotations for the various descriptions of frozen meat mentioned (last week's prices being also given for comparison):—

	Aug. 30.	Sept. 6.
New Zealand Mutton. (Crossbred Wethers and Merino Ewes.)		
Canterbury	$3\frac{7}{8}$d.	$3\frac{7}{8}$d.
Dunedin and Southland	$3\frac{3}{4}$d.	$3\frac{11}{16}$d.
North Island	$3\frac{11}{16}$d.	$3\frac{5}{8}$d.
Australian Mutton. (Crossbred and Merino Wethers.)		
Heavy (over 50 lb.)	$3\frac{7}{16}$d.	$3\frac{3}{8}$d.
Light (under 50 lb.)	$3\frac{7}{16}$d.	$3\frac{3}{8}$d.
River Plate Mutton. (Crossbred and Merino Wethers.)		
Heavy	$3\frac{7}{16}$d.	$3\frac{7}{16}$d.
Light	$3\frac{7}{16}$d.	$3\frac{7}{16}$d.
New Zealand Lambs.		
Prime Canterbury (32 lb. to 42 lb.)	$4\frac{7}{8}$d.	$4\frac{13}{16}$d.
Fair average	$4\frac{11}{16}$d.	$4\frac{5}{8}$d.
Australian Lambs.		
Prime (32 lb. to 40 lb.)	None offer-	—
Fair average	ing.	—
New Zealand Frozen Beef.		
Ox, fores (100 lb. to 200 lb.) ...	4d.	$3\frac{7}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	$4\frac{3}{4}$d.	$4\frac{1}{2}$d.
Australian Frozen Beef. (Fair Average Quality.)		
Ox, fores (100 lb. to 200 lb.) ...	—	$3\frac{5}{8}$d.
Ox, hinds (180 lb. to 200 lb.) ...	—	$5\frac{1}{4}$d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations of Australian and New Zealand lambs do not include sales of small lambs or heavies or inferior quality.

Eggs.—French, 8s. 6d. to 9s.; Danish, 6s. to 8s. 9d. per 120.

Bacon.—Irish, 64s. to 77s.; American, 56s. to 58s.; Canadian, 60s. to 62s. per cwt.

Hams.—Irish, 88s. to 94s.; American, 61s. to 66s. per cwt.

Tallow.—Beef, fine, £33 10s.; medium, £30 10s.; mutton, fine, £38; medium, £33 10s. per ton.

Animal Pathology.

SORGHUM POISONING.

So many inquiries have reached the Department of Agriculture as to the cause of the death of stock depastured on young growing sorghum, and as to what remedies are known for the alleged poisonous effects of the forage, that any light which can be thrown on the question cannot fail to be of great interest to stockowners.

Much attention has been devoted by the scientists of the Department to the matter, with the view of establishing the existence or non-existence of a poisonous element in the sorghum. The following letter addressed to the Under Secretary for Agriculture by Mr. Henry Tryon, Entomologist and Vegetable Pathologist to the Department, will, we think, set at rest any doubt as to the existence of a virulent poison in young sorghum plants, and it will further serve the purpose of allaying the fears of some who hitherto have not ventured to feed their stock even with matured sorghum:—

Brisbane, 13th August, 1902.

Sir,—Having regard to the fact that sorghum under some circumstances has proved poisonous to stock (a matter that has already engaged the attention of the Department), it would appear that a recent discovery on the part of the Scientific Department of the Imperial Institute, that the plant in question during a certain period of its growth naturally contains prussic acid (hydrocyanic acid), may have some significance in connection with the special action alluded to, and especially so should it appear that the toxic effects remarked accord with the well-known physiological action of this body. Of course the fact that hydrocyanic acid boils at 80 Fah., and that its vapour pressure is less than half an atmosphere at this temperature, would in the event of its presence in the animal organism in a measure account for its rapid absorption on being ingested.

The discovery to which allusion is made is announced in the June number of *Agricultural News* (the Fortnightly Review of the Imperial Department for the West Indies) in the following words:—

"Some recent research work in the Scientific Department of the Imperial Institute would appear to have afforded a solution to the vexed question of why cattle are sometimes poisoned by green sorghum (*Sorghum vulgare*). . . . . It would now appear that sorghum . . . . contains prussic acid. . . . . The poison occurs in the young plants, but gradually disappears as the seeds ripen. . . . ." (*Op. cit.* Vol. I., No. 5, pp. 70, 71.)

I have the honour to be, &c.,

HENRY TRYON,

Vegetable Pathologist and Entomologist.

The Under Secretary, Department of Agriculture.

Mr. Tryon has since sent the following further communication to the Under Secretary for Agriculture on the subject of the poison contained in young sorghum:—

Brisbane, 9th September, 1902.

Sir,—On the 13th August I had the honour to direct attention to a recent discovery made by the Scientific Department of the Imperial Institute, that sorghum was found to yield *prussic acid*, and to suggest that it might have some significance with reference to the fatality occurring amongst cattle in this State after partaking of the plant in question, and that had already engaged the attention of the Department.

I now tender, for your further information, the highly interesting authentic record of the discovery alluded to, extracted from the proceedings of the Royal Society of London, published in June of the present year.

In submitting this, I may take occasion to remark that apparently the authors of it (Messrs. W. R. Dunstan and T. A. Henry) have up to the present—being engaged in investigating the origin of cyanogen compounds in the vegetable kingdom—addressed themselves to the chemical aspect of sorghum poison, and that accordingly it might be highly expedient to ascertain if the facts that they have brought to light are in harmony with what has been observed regarding the attendant circumstances, both physiological and pathological, connected with the pronounced action of the plant here. This opinion is also that of the Government Veterinarian, Mr. W. C. Quinnell, at whose suggestion the reported discovery of prussic acid in sorghum was previously brought under your notice by me.

I have, the honour to be, &c.,

HENRY TRYON,

Vegetable Pathologist and Entomologist.

The Under Secretary, Department of Agriculture.

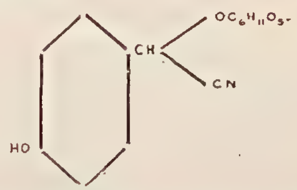
"CYANOGENESIS IN PLANTS. PART II.—THE GREAT MILLET, *SORGHUM VULGARE*."*

By Wyndham R. Dunstan, M.A., F.R.S., Director of the Scientific Department of the Imperial Institute, and T. A. Henry, D.Sc., Lond. Received 24th April. Read May, 1902.

(*Abstract.*)

The authors have investigated the nature of the poison contained in the young plants of *Sorghum vulgare*, the Great Millet or Guinea Corn (the *Juar* of India or *Dhurra shirshabi* of Egypt). This plant is cultivated in tropical countries for the sake of the seed, which is important as a food grain. The young plants have proved fatal to animals, especially in Egypt, where the attention of the authors was directed to the subject by Mr. E. A. Floyer, of Cairo, who has kindly provided the material required for the investigation.

The authors show that the young plant, but not the seeds or old plants, when crushed with water, furnishes prussic acid (about 0·2 per cent. of the dried plant). The acid is not present in the free state, nor is it produced by acting on the plant with boiling water or with alcohol. The production of the poison is due to the action of a hydrolytic enzyme, apparently identical with the emulsin of bitter almonds on a cyanogenetic glucoside, which has been named "dhurrin," from the Arabic name for the plant "dhurra." This glucoside has been proved to be derived from parahydroxylmandelic nitrile by the association of the residue of one molecule of dextrose. Its formula is therefore $C_{14}H_{17}O_7N$.



Thurrin crystallises well, and is soluble in both water and alcohol. When hydrolised by ulsin or by dilute acids, it is converted into parahydroxylbenzaldehyde, dextrose, and hydrocyanic acid, according to the equation $C_{14}H_{17}O_7N + H_2O = C_7H_6O_2 + C_6H_{12}O_6 + HCN$. When warmed with alkalis, dhurrin is resolved first into dhurrinic acid and ammonia. This acid subsequently undergoes further hydrolysis when warmed with dilute hydrochloric acid, being converted into parahydroxylmandelic acid and dextrose: (1) $C_{14}H_{17}O_7N + H_2O = C_{14}H_{18}O_9 + NH_3$; (2) $C_{14}H_{18}O_9 + H_{20} = C_8H_8O_4 + C_6O_{12}O_6$.

The identity of the parahydroxylmandelic acid was established by its synthesis from the cyanhydrin of parahydroxy-benzaldehyde.

Dhurrin differs from the other known cyanogenetic glucosides, the amygdalin of bitter almonds and the lotusin found by the authors in *Lotus arablcus*, in being derived from the dextrose and not from maltose.

The authors point out the protective purpose served by the existence of the cyanogenetic glucoside in the young plant.

The authors intend to fully investigate the several problems which are raised by the occurrence of cyanogenetic glucosides in plants.

They are at present engaged in examining several other plants which have furnished prussic acid, amongst them being:—*Manihot utilissima*, *Linum usitatissimum*, *Lotus australis*, and *Phaseolus lunatus*.

Extract.—Proceedings of the Royal Society, Vol. LXX., No. 461, pp. 153, 154, 19th June, 1902.

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* The authors' previous paper, entitled "The Nature and Origin of the Poison of *Lotus arabicus*" (Proceedings, vol. 67, 1900, p. 224; vol. 68, 1901, p. 374; and Phil. Trans. B. vol. 194, p. 515), is to be regarded as Part I. of this series.

Vegetable Pathology.

A NEW DISEASE IN BANANAS.

The Bulletin of *l' Union Syndicale des Agriculteurs d' Egypte* has just announced a disease (called "A Vermicular Banana Disease in Egypt") which rages with severity amongst the bananas of this country (Egypt), and which has only just been discovered.

This disease is characterised by the crinkled appearance of the leaves at their extremities; by the presence, in the sap of the plant and in the fruit of micro-organisms (nemator worms), and lastly by the presence of the same worm in the soil surrounding the roots. The plant is first affected in its greener parts, in the leaves and fruit, which latter are either small or dried-up; then the root is attacked in its turn.

This disease, which, in Egypt, attacks especially the variety known as the Jamaica banana, and for which, so far, no remedy has been found, is probably the same which raged on the island of Trinidad, and which appears to have there caused great damage in 1896.—*Journal d'Agriculture Tropicale.*

[This disease has long since been investigated by Mr. H. Tryon, Entomologist and Vegetable Pathologist to the Department of Agricultnre.—Ed. *Q.A.J.*]

THE WINE PRODUCTION OF THE WORLD.

The *Lyons Viticultural Moniteur*, France, has collected the statistics of the world's wine production for 1901. A summary which has been furnished by the American Consul at Lyons to the State Department of Agriculture at Washington, is published in *Station, Farm, and Home.*

This summary shows the French production to have been 1,530,223,200 gallons, a diminution of 247,869,600 gallons compared with 1900. The production of 1901 is 475,200,000 gallons above the average for the ten preceding years.

There has been an increase in the area devoted to viticulture of 12,093 acres in the last year, which gives a total area of 4,288,037 acres.

After France, the great producers of wine in the world are Italy, with 1,013,760,000 gallons in 1901; Spain, with 520,080,000; and Portugal, with 155,760,000 gallons. In Austria the crop was estimated at116,160,000 gallons, in Roumania at 87,120,000, in Russia at 76,560,000 gallons, in Bulgaria at 73,920,000, in Germany at 60,720,000, in Turkey (including Cyprus) at 50,160,000, in Switzerland at 31,680,000, and in Servia at 23,760,000 gallons.

Chili harvested in 1901 87,120,000 gallons; the Argentine Republic, 55,440,000; the United States, 39,600,000; Peru, 36,960,000; Brazil, 12,672,000; Uruguay, 2,376,000; Mexico, 924,000; Bolivia, 660,000 gallons.

Aside from Algeria and Tunis, which produce respectively 146,440,800 and 4,488,000 gallons, the vine is not seriously cultivated in Africa, except in the islands owned by Portugal (Madeira giving in a normal year 7,920,000 gallons), and at the Cape, which produces 3,168,000 gallons.

Australia produced 8,316,000 gallons.

Asia, which is the cradle of the vine, occupies a low place in the statistics, perhaps because Asiatic religions do not sanction the drinking of wine. Outside of Asia Minor the vine is not cultivated, save in Persia, where 765,600 gallons were produced in 1901. In China an Austrian company has embarked in the planting of vineyards. They occupy a vast territory, and several places are in full bearing. According to a French consul, the grapes are large and numerous, but they rot when the rains come, and ripen too fast when the sun shines. The wine, too, is inferior, and must be mixed with that of Europe before being fit to drink.

There is a general crisis for winegrowers, because of an over-production in the entire world.

General Notes.

MANIOC OR CASSAVA FLOUR.

The Imperial Institute, London, has forwarded to the Department of Agriculture, Barbados, the following note received from Messrs. W. and C. Pantin, 147 Upper Thames street, London, E.C., which may be of interest to West Indian planters and exporters:—

"Coarse Manioc.—What we are looking out for is a coarse, very cheap, manioc flour for manufacturing purposes, and we have already had some offered from Brazil, which will come about £6 per ton c.f.i. Hamburg. If you have anything in this line to offer us, will you kindly send us samples, and we shall be very glad to work up a business, and we think the quantities would be large."

Sweet potato flour would answer equally well; the only difficulty is the price. It would probably not pay at less than £9 per ton.

GOOD PICKLE FOR MEAT.

A good pickle for meat is composed of bay salt, 3 lb.; saltpetre, 2¼ oz.; moist sugar, 1 lb.; bruised allspice and black pepper, of each 1 oz.; water, 9 pints. Simmer them all together in a covered vessel for seven or eight minutes, when the pickle has cooled, remove the scum, and pour the liquid over the articles to be preserved. Generally used for hams, tongues, beef, &c., to which it imparts a fine red colour, and a superior flavour. Pork and hams are preferably preserved in the following pickle:—2 lb. each of bay salt and common salt, 1 lb. of moist sugar, ½ lb. of saltpetre, ½ oz. of bruised allspice, and a gallon of water, the whole being treated as directed above.

MUZZLED ROOSTERS.

The *Australian Agriculturist* is responsible for the following:—The crowing of roosters in the early morning is often a source of great annoyance, but a German inventor promises relief. He has patented an arrangement which is fastened to the rooster's bill at night by a clasp. This does not interfere in any way with the bird's breathing, but, when he attempts to crow, his clarion note will not come forth until the owner chooses to remove the clasp. The inventor hopes that after a time the rooster that wears the "anti-crower" will cease wanting to crow, even when the device is not attached to the bill, and a further hope is entertained that ultimately a race of non-crowing fowls may be evolved. Here is a much more sensible plan:—

Loquacious Cocks.

Cock-crowing during the small hours of the morning is a great nuisance to light sleepers, and something worse to invalids, and it can often be remedied to a great extent. There are few male birds lazy enough to crow while sitting on the perch; they have got to stand up and stretch out their necks to the fullest extent before they get out a rousing howl. All that is needed is to hang a light piece of wood, secured with a cord to the roof, right over the perch and sufficiently near to it that if a cock attempts to stand up straight his head comes in contact with it, and he finds it impossible to get his crow out. If it prevents him from standing straight up by about 1½ inches, it will do. He may make the attempt several times, but the result is always the same. As long as he sticks to the perch he will be silent enough. If the roosting-house is fairly dark and there is no access to the outside run until the birds are let out in the morning, they are not likely to leave the spar too soon. It must be remembered that cock-crowing at 2 or 3 o'clock in the morning is a nuisance to a neighbourhood, and it is by no means difficult to get a magistrate's order to have the birds removed.

PRICES FOR CATTLE FATTENED ON PRICKLY PEAR.

In August last 120 head of fat cattle were sold at Homebush, Sydney, by Messrs. Pitt, Son, and Badgery. They averaged £13 12s. per head. They came from Womblebank Station, in the Maranoa district, where there is a large quantity of prickly pear. The bullocks had been two years on the run when the drought was at its height. All this time they have existed on raw prickly pear, as do several thousands of cattle on the same station. This first lot of 120 were driven to Roma, a distance of 100 miles. Arrived there, they received 1 ton of lucerne hay. Then they were trucked to Chinchilla, where they were dipped and fed on 3 tons of lucerne hay. They were re-trucked to Wallangarra, again dipped and received the same quantity of oaten hay. Here a Sydney buyer offered £11 per head for them, but the offer was not entertained. The cattle were delivered in Sydney in prime condition. There are plenty more fats on Womblebank which have never fed on anything but prickly pear. Yet this plant has for years been looked on as a curse, and a reward of £5,000 is offered for a cheap plan of getting rid of it.

HOW TO CAN VEGETABLES.

To Can Corn.—Boil the young corn in the ear five minutes. Then cut from the cobs and pack it into the jars to within an inch of the top, and fill the rest with water. Put on the rubbers and tops and screw partly down. Put the jars then in water and boil two hours. Then screw the tops down tightly. Corn canned in this way will keep perfectly.

To Can Beans, Green.—Wash and string the beans, break them into inch lengths, pour over them boiling water, and boil fifteen minutes. Have the jars ready filled with hot water to heat them thoroughly. Turn out the water and quickly fill the jars with beans, adding as little as possible of the water in which they were boiled. Fill the cans until they are overflowing. Fasten on the tops and set away.

To Can Tomatoes.—Take sound, ripe tomatoes, scald, peel (and if large, cut into quarters), and fill the jars with them, also letting some cook at the same time in another vessel to fill the jars up with as the tomatoes shrink in cooking. Put the tops on only partially screwed down, then put them into a kettle of water and boil them until the tomatoes are cooked thoroughly. When done fill cans to overflowing with the separately cooked tomatoes, screw top down tightly and leave in the kettle to cook slowly. Tomatoes canned in this way retain their form well.

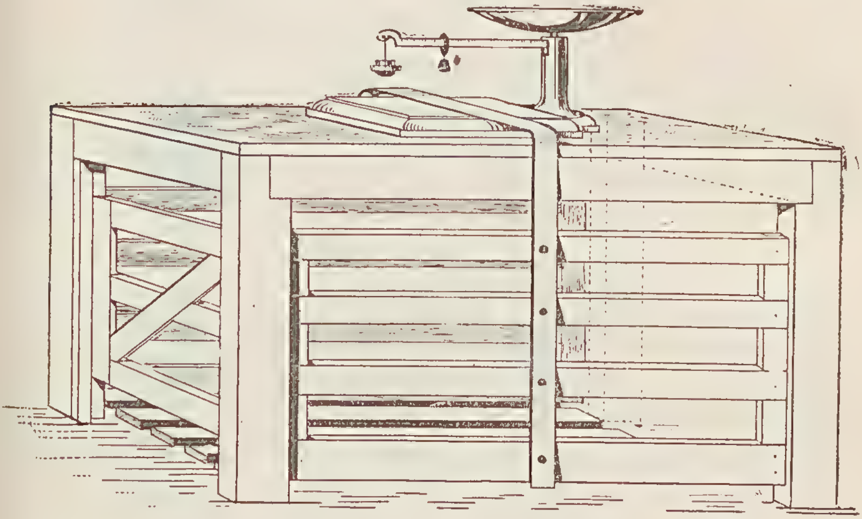
A LONG VINTAGE.

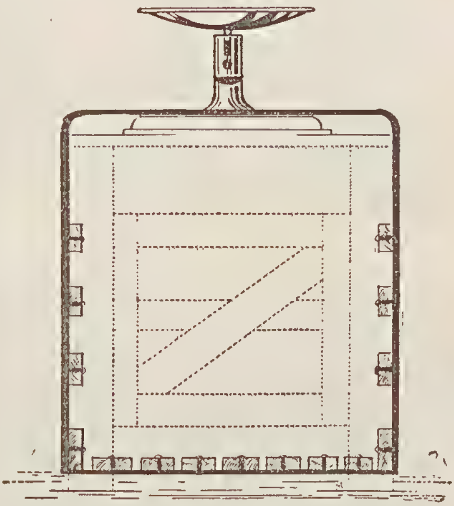
Mr. E. W. Haberecht, of Woodstock, North Queensland, appears to have been very fortunate in his vintage last season. He certainly has a small vineyard, as it only covers a little over half-an-acre, but its size enables him to give it every attention and to irrigate the vines. He thinks the last vintage was the longest on record. He sold grapes from the beginning of December right up to the 13th June. Having made some alteration in his pumping gear, he could not get sufficient water, and had therefore to depend on the rainfall. In February there were 4 inches of rain which brought on a heavy late crop. The weather proved mild, and most of it was got to market in splendid condition. From 1st May to 13th June half-a-ton of grapes was sold at from 10d. to 1s. per lb. The vines were then cleared of all the grapes remaining, and 40 gallons of wine of very fine quality were made.

The sales of grapes, taking them at 10d. per lb., would represent £46 13s. 4d., and 40 gallons of wine at, say, 2s. 6d. per gallon would come to £5 more. Such wine is often retailed by the makers at 4s. per gallon. A return of nearly £52 per half-an-acre is not to be despised, and should encourage all who have command of surface or well water to irrigate as much of their land as possible.

WEIGHING PIGS AND SHEEP.

The following description and illustration by Mr H. R. Stephens of an appliance to weigh pigs, sheep, or any animal up to the limit of scales, may be useful to readers of the *Journal*:—The appliance is somewhat in the form of a small table. The animal to be weighed is put into an enclosure which is



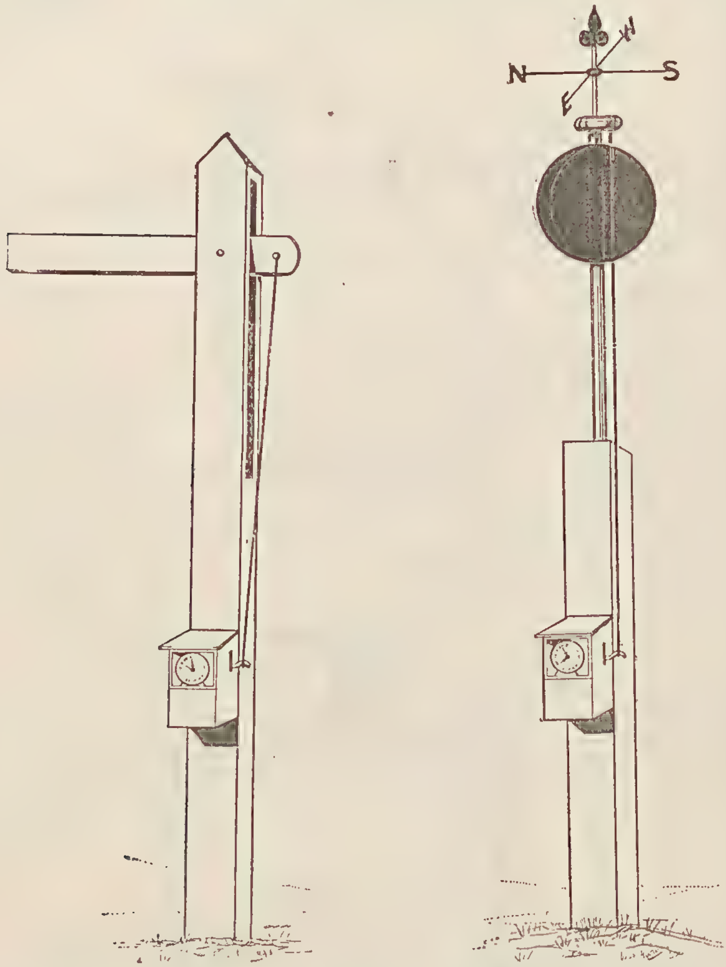


formed by the four legs of the table, admission to which is afforded by a door or bar at each end. Of course the table ought to be strongly made ,and the width only sufficient to prevent an animal from turning round when enclosed.

A FARM SIGNAL.

Mr. Stephens also writes:—Although farmers and, in fact, most other people have a good idea of when the dinner-hour approaches, it might be useful to some to know the time a little closer than can be guessed

by that bushmen's clock, the sun. The signal herewith described can be made in various ways, and attached to the farmhouse itself, if in a sufficiently prominent position, or, if not, a good high post sunk in the ground will do. The signal itself can be either a plain piece of board or



arm somewhat similar to a railway signal, or a more elaborate one may be made by crossing and riveting three 12-inch hoops of light iron, when an open ball is formed, which may be arranged to fall down a central rod. The signal itself is actuated by the clock device illustrated in the February number of *Queensland Agricultural Journal* of this year. It is advisable to always have the cord that raises the signal taut, as the wind is then prevented from entangling the line. A glance at the ball or signal-arm from the field where anyone is working will tell at once, "What's o'clock?" and, though sound appeals to the senses more readily than sight, the above-described appliance is a long way ahead of pulling the pig's tail to call the hands to dinner.

[Why not combine sound with sight? An old-fashioned nipple-gun loaded, the nipple capped—a poundweight of iron fixed to the bottom of the ball. On the dropping of the ball the gun is fired. This would prevent loss of time whilst tired and hungry men are watching for the fall of the time ball—Ed. *Q.A.J.*]

CURE FOR RHEUMATISM.

About a year ago there was published in a London paper a recipe for the cure of rheumatism. Since then some scores of people have written to thank the editor for it, many of them informing him that that simple prescription cured them after having been unsuccessfully treated by three or four physicians. Others, who have heard of the cure, have asked us to reprint the prescription. Everyone either suffers from rheumatism or knows some one who does, and we recommend our readers to paste this recipe on cardboard and take great care of it. Lord Anson, feeling that it was a shame that such a recipe should be so little known, paid £300 to a medical man for the privilege of making it known to the public. Here are the ingredients:—Sulphur, 1 oz.; cream of tartar, 1 oz.; rhubarb, ½ oz.; gum guiadum, 1 drachm; honey, 16 oz. A tablespoonful of this is taken night and morning in a tumblerful of white wine—hock, for instance—and hot water.—*Country Life.*

STRAWBERRIES PRESERVED WHOLE.

This is a very delicate and uncommon preserve, but one that, with proper care and attention, is just as easy to make as the ordinary strawberry jam. There are two methods of preparing it, the first of which is as follows:—Take equal weights of fruit and loaf sugar, say, 12 lb. of each, and allow for this quantity a teacupful of strained lemon juice and a quart of red currant juice. Put the sugar, which should be of fine quality and broken up into small pieces, into a scrupulously clean enamelled preserving pan with the lemon juice and red currant juice, and boil to a syrup, then, as soon as little beads form all over the surface, add the fruit, which has been carefully picked with as little handling as possible, the berries being perfectly sound but not over-ripe, and fairly even in size. Let all boil together gently for about twenty minutes, or just until the fruit looks nice and clear and is soft without being at all broken, then take up the strawberries with a large perforated spoon, so as to free them entirely from the syrup, and place them very lightly in small, thoroughly dry, hot jars; boil the syrup for about ten minutes longer, then pour it over the fruit, and set the jars in a cool, dry place overnight, after which cover with prepared parchments, and store as directed in my last paper. Strawberries preserved in this way are most delicious in flavour and lovely in colour, but they will not keep good for very long; therefore, when the preserve is intended to be stored for twelve months or more the following method should be adopted:—

A German Method.

Allow a pint of red currant juice and a pound and a-half of loaf sugar to each pound of strawberries, and crush half the quantity of sugar that is being used to a powder; then, after the fruit has been carefully picked, arrange it in layers in the preserving pan with the crushed sugar well sprinkled between each layer, and leave it so in a cool place for twenty-four hours. In the meantime the red currant juice can be obtained in the following manner:—Take the requisite quantity of very ripe but perfectly sound currants, and, after stripping them from their stalks and washing them, if absolutely necessary, put them into a jar with a closely-fitting lid, then set the jar in a saucepan of cold water, bring the latter slowly to the boil, and simmer gently until the juice begins to flow freely. About every half-hour after this, remove the jar from the water, carefully strain off the juice which has been extracted, cover the jar again and return it to the saucepan, and continue this process until no more juice can be drawn out. Next day put the remainder of the sugar into the preserving pan with the red currant juice, and boil until a clear syrup is formed, after which add the strawberries very carefully and boil slowly for ten or fifteen minutes, stirring gently and taking great care not to break the fruit; as soon as the latter looks clear and is quite soft remove it in the way already indicated, boil the syrup again—this time quickly—for about ten minutes, then pour it over,

and when quite cold finish off and store according to former directions. *Note.*—Various other fruit, such as raspberries, cherries, blackberries, &c., may all be preserved in precisely the same way, and it is wise to always have a few jars on hand, as they prove exceedingly useful on special occasions, being generally regarded as an extra treat.

Red currants are not procurable in Queensland, but there should surely, in these enlightened times, be some means of importing the fruit or the juice from the southern States, New Zealand, or Tasmania. Possibly experiments might show that a substitute may be employed.

REMEDY FOR APHIS.

"Trogyllium" writes: Put 4 oz. of soap and sulphur into an ordinary billy or white-lead drum. Half-fill with water. Leave it on the stove all night to blend. Next afternoon, fill up with water at blood heat. Immerse the young flowering and fruiting twigs in the warm lather, one by one, with a gentle whisking motion which separates the leaves. This is instant death to the pest, and the embryo fruit is unharmed.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Times of Sunrise and Sunset, 1902.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·30	5·32	5·44	5·2	6·2	4·50	6·24
2 ...	6·5	5·31	5·31	5·45	5·0	6·3	4·50	6·24
3 ...	6·4	5·32	5·29	5·45	4·59	6·5	4 51	6·25
4 ...	6·2	5·32	5·28	5·46	4·58	6·6	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·57	6·7	4·51	6·26
6 ...	6·1	5·33	5·26	5·47	4·57	6·7	4·51	6·28
7 ...	6·0	5·34	5·25	5·47	4·57	6·7	4·51	6·28
8 ...	5·59	5·35	5·24	5·48	4·56	6·8	4·50	6·30
9 ...	5·57	5·35	5·23	5·49	4·56	6·8	4·50	6·30
10 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·31
11 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·32
12 ...	5·54	5·36	5·21	5·49	4·55	6·9	4·50	6·32
13 ...	5·53	5·37	5·20	5·50	4·54	6·10	4·51	6·33
14 ...	5·51	5·37	5·19	5·50	4·54	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·54	6·12	4·52	6·34
16 ...	5·49	5·38	5·18	5·50	4·53	6·13	4·52	6·34
17 ...	5·48	5·38	5·17	5·51	4·52	6·14	4·53	6·35
18 ...	5·47	5·39	5·15	5·51	4·51	6·15	4·53	6·35
19 ...	5·45	5·39	5·15	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·49	6·17	4·54	6·37
21 ...	5·43	5·40	5·13	5·53	4·49	6·18	4·54	6·38
22 ...	5·42	5·40	5·12	5·54	4·49	6·18	4·54	6·38
23 ...	5·41	5·41	5·11	5·55	4·49	6·19	4·55	6·39
24 ...	5·39	5·41	5·9	5·55	4·49	6·19	4·55	6·39
25 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
26 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
27 ...	5·36	5·43	5·7	5·57	4·49	6·21	4·57	6·41
28 ...	5·35	5·43	5·6	5·58	4·49	6·22	4·57	6·41
29 ...	5·34	5·44	5·5	5·59	4·49	6·22	4·58	6·42
30 ...	5·32	5·44	5·4	6·0	4·49	6·23	4·59	6·42
31 ...	...	...	5·3	6·1	...	...	4·59	6·42

Phases of the Moon.

			H.	M.
1 Sept.	●	New Moon	17	19·4
9 ,,	☽	First Quarter	10	14·9
17 ,,	○	Full Moon	6	23·4
24 ,,	☾	Last Quarter	4	31·5
1 Oct.	●	New Moon	5	9·1
9 ,,	☽	First Quarter	5	21·1
16 ,,	○	Full Moon	18	1·1
23 ,,	☾	Last Quarter	10	58·1
30 ,,	●	New Moon	20	13·6
8 Nov.	☽	First Quarter	0	30·5
15 ,,	○	Full Moon	5	6·5
21 ,,	☾	Last Quarter	19	46·9
29 ,,	●	New Moon	14	4·4
7 Dec.	☽	First Quarter	18	26·5
14 ,,	○	Full Moon	15	47·4
21 ,,	☾	Last Quarter	8	0·2
29 ,,	●	New Moon	9	24·8

Answers to Correspondents.

POISONING OPOSSUMS.

Phalanger, Geham—

Question.—Can you tell me how to poison opossums? Several persons here have tried to do so, but have always failed.

Answer.—Try cyanide of potash mixed in pollard, and as a "decoy" add a little oil of aniseed or oil of rhodium.

CONSTITUENTS OF FOOD PLANTS.

J. F. Cory, Kolan River South.—In reply to the request of yourself and others for an up-to-date table of the composition of food plants, we purpose shortly publishing such a table. Meanwhile we refer you to Dr. W. Maxwell's letter on the subject in this issue :—

Brisbane, 30th August, 1902.

Sir,—I have the honour to receive your letter of 30th August, asking me concerning tables of the constituents of fodder plants.

I very fully appreciate your inquiry, and its relation to the present pressing needs of our agriculturists, and I may say to you at this time, or rather since the chemist of the Department (Mr. J. C. Brünnich) came under my direction, a thoroughly systematic examination of all food stuffs and agricultural products has been commenced. So far this work has included the examination of the better known leguminous plants, beans, peas, &c., other forage plants such as mustards, rapes, roots and bulbous varieties : likewise the examination of varieties of maize and maize cobs, &c. The object of this work being to actually determine on the one hand the food value, and likewise the manure value of all these several kinds of plants. I expect to publish the results obtained so far very shortly, which will cover the request which you have made.

In the meantime, however, our agriculturists can make use of every sort of available plant growth or manufactured product within their reach. Just now the first question is not " What will fatten an animal the quickest at the least cost, but really what will keep our animals alive?" and food stuffs are being advised which, under normal conditions, would not be thought of. One thing I notice, and in very many districts, farmers are burning the corn cob, which is a very nutritious food stuff. The analyses of the corn cobs, which will be published before very long, will show how valuable the corn cob is, and especially in periods of drought such as the present.

In the sugar districts—North—some of the mills are buying up all the corn cobs available, and grinding those into a meal and mixing the meal with equal quantities of molasses, to which a little lime is being added in order to consolidate the whole into a dry and portable cake. This is a good food stuff in present emergencies.

Speaking of molasses and of low-grade sugars, these have not only a very considerable direct feed value, but coarse food stuffs such as coarse grasses, &c., &c., which animals would rather starve than look at if fed alone, are made highly palatable by the admixture of portions of molasses or melted low-grade sugars. I have already advised such use of these products of the sugar house on a considerable scale, as, it has already been said, just now, we have to devise means of converting the coarsest kinds of plant material into edible forms such as our starving stock will look at.

As soon as the analytical data referred to above are ready for publication, I shall have something more to say upon the subject of food stuffs.

I have, &c.,

W. MAXWELL.

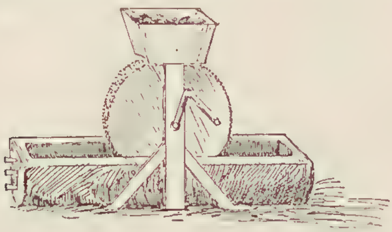
Editor, *Queensland Agricultural Journal.*

ARROWROOT MACHINE.

An Albert River Farmer—

Question.—Would you kindly tell me how to make cheap machine for grinding arrowroot? I only grow a little, but the work of grating it is too slow. I am told you made one once and described it in one of your *Journals*, but I cannot get that *Journal.*

Answer.—Our primitive machine was constructed thus :—First, a log of about 2 feet in diameter and 8 feet long was hollowed out by axe and adze into the form of a trough. At the head of this trough was fixed a framework much like the wooden stand of a grindstone, only of course, much taller. A large wheel was then cut from a perfectly sound gum log, 3 feet in diameter and 1 foot wide. Tin-plates, turned into graters (requiring frequent renewal) by punching holes in them with a flat wrought-iron shingle nail, were nailed onto the edge of the wheel, to which a stout wooden axle and windlass handle were attached. The wheel was fixed so as to revolve in the water with which the trough was filled.



On top of the framework was a wooden hopper in which the washed bulbs were placed, falling on the grater wheel. One man turned this with ease, and the bulbs were rapidly grated and fell into the trough in the shape of pulp and starch. The former was removed with a scoop and the latter subsided to the bottom. The water was then gradually drawn off by removing pegs inserted into the lower end of the trough. The starch was then dug out and washed in the usual way. Such a machine is quite good enough for making arrowroot for home use. It would also be useful for grinding cassava.

VARNISH FOR TANK, Etc.

John Nebl, Toronto Farm, Coolabunia, Nanango—

Question 1.—Will you let me know where I can get a sort of varnish to make a cemented tank watertight, called waterglass?

Answer 1.—Messrs. Elliott Bros., Eagle street, Brisbane, can supply waterglass at 3d. per lb.

Question 2.—Is there a sort of banana which will fruit on the high lands up here; if so, where is it to be obtained?

Answer 2.—Mr. A. H. Benson says:—There is too much frost at Coolabunia to permit of the cultivation of the banana on a commercial scale. A few plants might, however, be planted in sheltered positions for home use. Only one variety is likely to thrive—viz., the Common Plantain. Suckers of this variety can be obtained from any district in which bananas are grown, although not in quantity, as it is not extensively grown. Mr. Duhs, Walloon, grows more of this variety than anyone I know of.

Question 3.—Has a man the right to make an article which has been patented, in exactly the same form for his own use?

Answer 3.—No person may manufacture a patented article for which Letters Patent are still in force, unless under license from the patentee.

ONIONS AND PARSNIPS.

"Buxar," Bingera Scrub—

Question 1.—What is the best time to sow onions in this district?

Answer 1.—March and April.

Question 2.—How to plant?

Answer 2.—See articles on onion-growing in the *Queensland Agricultural Journal* of September, 1899, and February, 1900.

Question 3.—Please answer the same question as to parsnips, &c.?

Answer 3.—See article on carrots, parsnips, turnips, and beetroot in *Queensland Agricultural Journal* for June, 1899.

MARE WITH CHRONIC COUGH.

Enquirer, Isis—

Question.—Some six months ago a draught mare of mine was troubled with a cough, and had at the same time a watery discharge from the nostrils. I turned her into the paddock and did not work her for some months. Since bringing her into work again her cough has become worse; in fact, it is now almost incessant, and now and then thick clots of matter drop from the nostrils. She does not now care for her feed (cane-top "chop-chop," mixed with chaff and maize), and is rapidly losing condition.

Will you kindly, in your *Journal*, recommend treatment and feed I should give her?

Answer.—Diagnosis: Catarrh, chronic nasal, or nasal gleet—a continuous or intermittent discharge from one or both nostrils is frequently observed in the horse.

It may be the result of an ordinary cold in the head, especially if such has been allowed to be somewhat neglected or otherwise improperly treated, but as a rule it is more frequently the outcome of some diseased condition in the nostrils or compartments in connection with these; hence it is quite possible that it may be associated with disease of the upper molar, or bone carrying these, through irritation produced by growth of a lower molar, morbid growths in the passage; collection of matter in the pouches, or within the air sinuses (compartments); injuries and disease of other bones in this region.

Treatment.—If it is thought that the gleet is purely the result of a continued inflammation of the membrane lining the nostrils, subsequent to a previous attack of an acute cold in the head, then it is advisable to try the effects of compound iodoform powder. This powder can be readily brought into contact with the most of the surface of the membrane lining the nasal passage by means of a simple contrivance known as a "diffuser" or "insufflator" (an India-rubber ball with a nozzle). About ¼-oz. of the powder should be used daily in this manner. The animal's head must be steadied.

While a course of Fowler's solution of arsenic will help to improve the constitution. This liquid can be given in tablespoonful doses in the food or water, night and morning.

Collections of matter within the air sinuses (spaces) require a veterinary operation known as "trephining"—*i.e.*, removing a circular portion of bone, in order to allow the pus free exit, and at the same time to enable the closer application of remedial agents. But, as the performance of the operation requires skill and anatomical knowledge, it would be useless to enter into details regarding the methods of operating.

When the simpler treatment given fails, "Inquirer" will do well to consult a veterinary surgeon as to the advisability of this operation.

A QUESTION OF FENCING.

H.H., Scrubby Creek, Pittsworth—

Question 1.—Four years ago I bought a farm. The previous owner told me that the left half of my boundary fence was mine and that I must keep it in repair. My neighbour, who had put wire netting on this portion, previous to my occupancy, removed it after twelve months. I want to make this part of my paddock wallaby proof. Can I force him to replace the netting or can I compel him to make the right half pig proof? I keep pigs and he does not.

Answer 1.—If a dividing fence requires repair notice may be served by either owner on the other to assist or contribute to the repairing of such fence.

If the occupier who has received notice fails or refuses to assist in such repairs within three months, the other party may repair it himself and recover half the cost from his neighbour.

In case of dispute or difference between the owners or occupiers of adjoining lands, the matter may be settled by an appeal to the law. The justices then may decide as to the description and sufficiency of any fence erected.

In no case shall a judgment be given which will involve an expense in the erection of any fence exceeding the fair and usual price for the erection of a three-railed fence, and the amount sought to be recovered shall only have reference to the state of the fence at the time and not to the original cost of the fence.

As you keep pigs and he does not you must make your whole fence so secure that your pigs cannot annoy him, but you cannot compel him to share the expense of palings or wire unless you are in a town.

The question of forcing your neighbour to replace the netting is a question for a lawyer to answer.

Question 2.—Does the Fencing Act of Queensland contain any definition as to which part of the fence each neighbour has to keep in order?

Answer 2.—Clause 12 of the Queensland Fencing Act says:—The owners or occupiers of any adjoining lands may agree between themselves as to what portion of the fence each shall keep in repair or erect. Such agreement must be in writing and must be witnessed by a clerk of petty sessions.

ANOTHER FENCING QUESTION.

Enquirer, Nambour—

Question.—A, who has a farm partly fenced, keeps cows. B, who has a farm, one side (road) fenced, grows cane, &c. A's cows get into B's farm and destroy cane. Is A liable, or is B supposed to fence to keep cows out? The farms do not join.

Answer.—The question is rather vague. Does B grow cane, &c., on land only fenced on one side? If so, B, not having enclosed all his land by a sufficient fence, is not entitled to any damages under the Impounding Act for loss from destruction of his cane. But, under section 46 of the Impounding Act, he is not debarred from entering a civil action against the owner of the cows through which the damage to his cane was caused.

TO DESTROY CABBAGE MOTHS.

C. N. Clarke, Hillgrove, Townsville—

Question.—Can you tell me of anything that will destroy the small grey moth which infests cabbage plants?

Answer.—Spraying with 2 fluid ounces of black leaf tobacco to 1 gallon of water is an effectual remedy. Spraying with the resin and soda wash is also good, and has proved very satisfactory at the State farms. A fine spray must be used, and the application of the spray repeated when necessary. Paris green, unless used in conjunction with some adhesive wash such as those mentioned, would not stick on the leaves, and hence would do no good.

GINGER WINE.

K.G., Eudlo—

Question.—Will you please give me a recipe for making good ginger wine?

Answer.—Boil 20 lb. of sugar in 7 gal. of water for half-an-hour, skimming it well. Then put 9 oz. bruised ginger in a portion of the liquor, and mix all together. When nearly cold, put 9 lb. of raisins, chopped very small, into a cask capable of holding 9 gallons. Add 4 lemons (sliced), after taking out the seeds, and pour the liquor over all, with half-pint of yeast. Leave the cask open for three weeks, keeping it filled up with some of the reserved liquor, and bottle it from six to nine months.

BAMBOO FOR STOCK.

A. S. Sassauve, Lowmead—

Question 1.—Can you tell me if bamboo is safe feeding for horses and cattle, or does it cause deaths among them?

Answer 1.—Bamboo leaves and young shoots are perfectly safe fodder for stock.

Question 2.—What quantity may be fed per diem?

Answer 2.—This depends upon the nature of the cow; 25 to 30 lb. per day is as much as a cow would care to eat of bamboo leaves, probably not nearly as much.

FERTILISER FOR CORN (MAIZE).

S. F. Parkinson, South Isis—

Question 1.—My farm consists of red volcanic soil, part scrub and part forest. I planted part of the forest land with corn, and had a very poor return. What fertiliser would you recommend, and how much per acre?

Answer 1.—Potassic fertilisers produce the highest yield of cobs and stalk; 160 lb. sulphate of potash and 160 lb. superphosphate, or 160 lb. nitrate of soda, 320 lb. superphosphate, and 160 lb. sulphate of potash per acre. By using these, crops have been increased from 34 bushels per acre to 81 bushels. Sow the superphosphate and potash in drills before planting, as they are retained by the soil. Nitrates leach through the soil, and should therefore be applied as a top dressing during the growing season. Artificial fertilisers may be obtained from Messrs. Webster and Co., Mary street, Brisbane.

CHICORY.

S. STEPHENS, Carrara—

Question 1.—When is the proper time to plant chicory in Southern Queensland?

Answer 1.—Prepare the soil in August. Then sow in drills 2 feet apart; cover slightly. When the plants are large enough, transplant in wet weather.

Question 2.—What is the cheapest and best plan to dry a small crop of chicory, say under 5 acres annually?

Answer 2.—The sun. The crop is ready to dig in February, our hottest month. Cut the roots into small slices. A drying plant would consist of a kiln which can be cheaply built, and where the drying can be regulated. If you wish to roast the chicory, revolving iron cylinders are used.

Question 3.—Sugar-cane being cut now for fodder by coloured labour—will that debar a man from getting the rebate on sugar resulting from those stools if cultivated and cut for the mill by white labour next year?

Answer 3.—It is impossible to say what the Federal Minister will do, but we should answer—No.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	SEPTEMBER. Top Prices.
Apples, eating, per case	12s.
Apples, cooking, per case	7s.
Oranges, per case	7s.
Mandarins, Scarlet, per case	13s.
Mandaring, Emperor, per case	10s.
Lemons, per case	11s.
Lemons, Mildura, per case	10s. 6d.
Passions, per quarter-case	4s.
Custard Apples, per quarter-case	5s. 6d.
Gooseberries, per quart	5d.
Tomatoes, per quarter-case	6s. 6d.
Strawberries, per quart	1s. 7d.
Citrons, per cwt.	9s.
Seville Oranges, per cwt.	10s. 6d.
Pineapples, rough, per dozen	4s.
Pineapples, Queen, per dozen	5s. 6d.
Bananas, per dozen	2½d.
Bananas, per bunch	1s. 6d.

AVERAGE TOP PRICES FOR AUGUST.

Article.		August. Top Prices. £ s. d.
Bacon	lb.	0 0 9
Bran	ton	9 17 0
Butter, First	lb.	0 1 8
Butter, Second	"	0 1 4⅗
Chaff, Mixed	ton	8 2 0
Chaff, Oaten	"	7 10 0
Chaff, Lucerne	"	13 18 0
Chaff, Wheaten	"	6 10 0
Cheese	lb.	0 0 10
Flour	ton	10 16 0
Hay, Oaten	"	6 18 0
Hay, Lucerne	"	13 0 0
Honey	lb.	0 0 3
Rice, Japan (Bond)	ton	15 0 0
Maize	bush.	0 6 1⅗
Oats	"	0 4 0
Pollard	ton	9 15 0
Potatoes	"	6 16 0
Potatoes, Sweet	"	Nil.
Pumpkins	"	6 13 0
Sugar, White	"	19 10 0
Sugar, Yellow	"	16 10 0
Sugar, Ration	"	13 16 0
Wheat	bush.	0 5 2
Onions	cwt.	0 9 0
Hams	lb.	0 1 0$\frac{1}{10}$
Eggs	doz.	0 0 11
Fowls	pair	0 4 3
Geese	"	0 5 2¼
Ducks, English	"	0 3 11⅖
Ducks, Muscovy	"	0 4 8⅖
Turkeys, Hens	"	0 7 0
Turkeys, Gobblers	"	0 16 10⅘

ENOGGERA SALES.

Article.	August. Top Prices. £ s. d.
Bullocks	15 12 6
Cows	10 4 0
Wethers, Merino	1 4 10
Ewes, Merino	0 19 7
Wethers, C.B.	1 3 3
Ewes, C.B.	Nil.
Lambs	0 17 3
Baconers	2 3 6
Porkers	1 5 0
Slips	0 12 6

Orchard Notes for October.

By ALBERT H. BENSON.

Keep the land well cultivated, and, if dry, see that it is well stirred, but not turned. Attend to the disbudding of all young trees, for, if superfluous growths are checked now, they are converted into fruit-wood, and the vigour of the tree is thrown into those shoots which are to form the future branches of the tree. Disbud all vines, rubbing out all superfluous shoots, leaving only as many canes as the vine is strong enough to mature fruit to perfection on.

Sulphur all vines to prevent oïdium, as, if there is any muggy weather during the month, this disease is sure to make its appearance. Where Black-spot is present, spray the vines with Bordeaux mixture; and if caterpillars are troublesome as well, then add 1 oz. of Paris green to each 2 gallons of Bordeaux mixture, and both pests will be destroyed by the one spraying. When using Bordeaux mixture, there is no necessity to use sulphur for oïdium, as the Bordeaux mixture answers equally as well. Don't spray when the vines are in blossom; but with varieties that are shy setters it is often a good plan to sulphur when in blossom.

The nursery should be carefully attended to; where not already done the ties of all grafts should be cut and the scions should be trained so as to make a single upright stem. Where buds have been put in, they should be started by cutting back the stock sufficiently to cause them to grow, but the stock should not be cut hard back all at once, but by degrees, always leaving a portion of the stock above the bud to tie the young shoot to. Plant pines and bananas during the month, selecting suckers from healthy plants and from plants that are good croppers, and that produce good fruit, as a careful selection of suckers always pays well. Continue the treatment for Maori or Rust Mite of the orange recommended in the Notes for September; and where orange bugs, either the green or bronze, are present, destroy every mature insect that can be found, so as to prevent them breeding, as the killing off of the first crop will materially lessen their number for the season. Hand-picking, though slow, is probably the best remedy, though, before the insects are fully grown, large numbers may be destroyed by driving them on to the main branches of the tree and sweeping them off with a broom on to a cloth, from which they can be gathered and killed. Take every possible precaution against the fruit fly by destroying every infested fruit that you can. If there are maggots in cumquats or any other fruits, destroy everyone, as the cleaner the sweep that is made of the first crop of flies the less trouble there will be throughout the season. Where Scale Insects have been introduced on young trees into clean districts, every care should be taken to keep the pest from spreading; and in cases where the young trees are badly affected, it will pay the grower to destroy them at once, as the first loss will be the least. Where leaf-eating insects of any kind are troublesome—such as caterpillars of all kinds, the larvæ of the fig beetles, or the false ladybirds that attack all kinds of cucurbitous plants, potatoes, &c.—they can be readily destroyed by a spraying of Paris green, 1 oz. to 10 gallons of water, with lime added in as large a quantity as can be got through the nozzle of the pump without choking, as this will tend to make the poison stick on better to the leaves, branches, or fruit.

Farm and Garden Notes for November.

Why do so few farmers grow their own vegetables? This is a question that is frequently asked by visitors to the farming districts. The reason, probably, is that vegetables require a good deal of care and attention, which mean also a good deal of time taken from the ordinary farm work. In many cases it pays the farmer better to buy many kinds of vegetables than to grow them for himself. The only vegetables grown on many fine farms are cabbages and pumpkins, not to class potatoes under that head. Many people have an idea that European vegetables cannot be grown during the hot summer months, but this is a great fallacy. The Chinese gardeners supply the towns with all kinds of vegetables, except perhaps cauliflower, during the whole of the summer. It is therefore clear that, by constant work, plenty of manure, water, and some shade for seedlings, most vegetables can be produced during the hot months from November to March.

Field.—Under ordinarily favourable conditions harvesting the wheat and barley crops might have been now begun, but owing to the severe drought it seems ironical to suggest to farmers that the wheat harvest should now begin, seeing that thousands of acres are lying either unseeded or with the ungerminated seed lying rotting in the ground, under the influence of the late rains. All that can now be done under these unfortunate circumstances is to get the unoccupied land ready for maize. Those who have oats for hay should cut it when the grain has formed, but before it is ripe, for then the plant is in its most nourishing condition. Destroy caterpillars on tobacco plants, and top the latter so as to throw all the strength into the leaves. Keep down the weeds, which will now try to make headway; earth up any growing crops requiring the operation; sow maize, imphee, setaria, Kafir corn, teosinte, sorghum; and plant sweet potatoes, yams, earthnuts, ginger.

Kitchen Garden.—If your ground has been trenched or deeply dug and well worked, the advantages will be seen during the coming month. It does not pay to work shallow, dry ground. When sowing and planting this month, give plenty of room between the rows and the plants, otherwise they will be drawn up and worthless, and keep the ground open by constant forking and hoeing. Thin out melon and cucumber plants. It is a good plan to peg down the vines. They will then not be blown about by the wind; they will take root at intervals, and thus help the main stalk. Give plenty of water to tomatoes planted out last month. They should also be mulched. Sow cabbage, French beans, melons, lettuce, radish, pumpkins, cucumbers, marrows, rosellas, &c., and transplant for succession in calm, cloudy weather.

Flower Garden.—Stake any dahlias which may now be above ground. Plant out the bulbs which were stored in a moist place. If the weaker bulbs are reserved, they will come in for autumn planting. Take up all bulbs that have done flowering, and store in a dry place. Winter flowering plants will have gone off almost; still the garden should be in full bloom and will well repay the trouble bestowed on it, and a little fertiliser given as a top dressing will assist the plants to bloom and look well for a longer time than if this were neglected. Give weak liquid manure to chrysanthemums, and allow no suckers to grow till the plants have done flowering. Take up narcissus. Do not store them, but plant them at once in new situations. Sow antirrhinum, balsam, zinnia, summer asters, summer chrysanthemums, calliopsis, and nemophila.

Agriculture.

FIRST STEPS IN AGRICULTURE.

THIRD STAGE.

15th Lesson.

By A. J. B.

I think I need hardly impress upon you the value of Poultry on the Farm. Every farmer should keep a certain number of fowls. But how few realise the enormous value of the poultry industry to a State as a whole? The Americans understand it far better than we Australians. You would scarcely credit that the year's earnings of all the poultry in the United States would suffice to buy all the dairy cows in that country with £5,000,000 to spare. The poultry earnings of one year would buy all the gold, silver, wool, and sheep produced in a year, with the tobacco crop thrown in, and still there would be nearly six and a-half million sovereigns left for other speculations. The cotton crop of the United States is worth about £51,000,000 a year; the poultry bring in £58,000,000 a year; wheat produces £47,000,000; pigs £37,000,000; oats, £32,000,000; and so on.

I just mention these figures to show how very important is the poultry business. You may say that you only keep fifty fowls, which bring you in about 3s. a week in eggs. But suppose if 37,000 farmers each keep fifty fowls, and each gets 3s a week, that means £4,500 a week, or £234,000 a year in hard cash paid to the farmers. What could not farmers do if every year they were presented with nearly a quarter of a million sovereigns? And when you come to think of it, the money received by the housewife for eggs and poultry reared on the farm is really a gift, for the fowls are scarcely any expense to a farmer except in times of drought. There is so much corn, wheat, barley, and other grain scattered about at the various harvest times, so much waste green food, &c., that the birds practically keep themselves. Every hen which brings out a dozen chickens makes you a present worth more or less money according to the value of the breed. Every turkey hen, duck, or goose does the same. Then why not keep fowls?

I do not advise the starting of a poultry farm by itself. Such ventures have rarely paid, but, in conjunction with agriculture, a limited number of fowls and ducks will put many a pound into your pocket at almost no cost. Say you run 100 fowls on a 50-acre farm. They will lay from five to six dozen eggs a week for the market, besides more for sitting purposes, and, where wheat and maize are grown, these 100 bright-eyed scratchers will find the scattered grain and turn into money what otherwise would be ploughed in and lost.

Now, let us suppose that you have decided to keep a flock of poultry. The first question for you to determine is whether you will breed for eggs or for poultry for the market. I should advise you to begin breeding for eggs. What breed is the best for that purpose? You may at once put aside the Indian game and its crosses even with a laying breed. They are bad layers, and the crosses are no better.

The best layers are the White and Brown Leghorns, Buff Orpingtons, Minorcas, White and Silver Wyandottes, and their crosses Leghorn-Minorcas and Wyandotte-Leghorns. Plymouth Rock-Leghorns and Minorca-Langshans are also excellent layers. A crossbred fowl will answer better than a purebred on land which is exposed and cold.

Always keep in mind that the cock and hen should be unrelated. There are few exceptions to that rule. Be careful to buy only healthy birds. Stamina and good condition are all-important. In-and-in breeding should be

avoided. It is certainly the quickest way of establishing a flock, but is pretty sure to end in undermining the constitution of the birds and reducing them to small weeds. Besides, there is another result from the practice, and that is the production of unfertile eggs. You avoid the danger by periodically introducing new blood from pure strains.

Crossing purebred birds of different breeds is a very profitable proceeding. The first cross is always the best, because it unites the best qualities of either breed. Always choose hens, if you mean to have good layers, which have large combs.

You must not expect your hen to lay an egg every day. Even the very best layers of small eggs—the Hamburghs—rarely lay 250 eggs in the year. Brown Leghorns will lay about 200. Generally you will find that your best hens will lay, on an average, four eggs weekly. Then after laying a couple of dozen they will suddenly stop laying for over a fortnight—perhaps three weeks.

Well, having decided on the breed you intend to keep, and having carefully selected a number of crossbred and pure hens and a purebred cock, you remove them to your own farm, where the necessary fowlhouses should have been built ready for them. This removal will probably cause them to stop laying for a little while, but they will begin again as soon as they become accustomed to their new surroundings.

Many years ago few people troubled about shelter for their poultry. They either roosted on the trees, in the barn, or on a rough roost in the farmyard. In the trees or on the roosts they were exposed to rain and cold winds, to the attacks of snakes, iguanas, and native cats. But nobody took any trouble to care for them. They cost nothing to keep, so they took their chance.

But I want you to start properly. That does not mean rushing into expensive buildings and yards, but it means erecting suitable shelter, suitable protection from prowling animals, and suitable breeding places. All this can be got at small expense, and by the labour of your own hands. *Never build a wooden fowlhouse.* There is a terrible enemy of poultry called THE POULTRY TICK. If this insect once gets into a wooden poultry-house, almost the only remedy is to burn the structure down. Build your poultry-house of galvanised iron—good second-hand iron will do. First build a framework of hardwood, to which nail your iron sides on the inside. Should the poultry tick appear, all you have to do is, when the fowls have left it, to pile in some straw and set it on fire. The ticks which are hiding in the nooks and crannies of the roosts will all be destroyed, and the heated iron will kill any which may be lodged in its overlappings. The house itself suffers no damage, as the framework is outside.

Now, about the roosts in the house. People always place them too high. Both laying hens and table birds are liable to injure themselves by flying down from a height. Often they fly violently against the walls. Let your roosts be only 2 or3 feet from the ground, and do not put one above the other. Many people prefer flat roosts to round ones, but Nature has so constructed the muscles of the fowl's foot that, like other birds, it seems to prefer the round roost. A sort of ladder made of a board with battens nailed across it is useful to enable them to reach the roosts quietly. Never have your breeding places in the same house as the roosts. The sitting birds must not be disturbed by the layers going to and coming down from roost. Let them have a separate house and comfortable boxes to sit in. The boxes should have no bottom. The nest should be built on the ground, so that the eggs may be kept moist by the damp extracted from the soil by the warmth of the hen's body.

Never run a rooster with your laying hens ; I mean with those whose eggs are intended for market. Eight strong, healthy hens and one cockerel should form a breeding pen, and, as I said, take care that the cockerel is a good one in every respect.

When a hen is sitting, take care not to disturb her or try to make her feed. She is quite happy. Sitting is a rest to her, and she does not require much

food. She will sometimes get off the nest and pick up grain while stretching her legs, but a good sitter will never allow her eggs to get cold owing to her long absence.

When the chicks come out of the shell, it is not necessary to feed them for the first twenty-four or thirty-six hours, because, immediately before hatching, they have absorbed the yolk sac into their stomachs, and this contains sufficient nutriment to sustain them for the time mentioned. At the end of this time they should be removed from the nest to the coop, and their first feed should consist of hard-boiled eggs chopped fine and mixed with fine breadcrumbs or, better still, biscuit-meal. Breadcrumbs are liable to make them scour. You should just barely moisten the food with a little milk. Don't make it sloppy. After three or four days, leave out the egg food and give biscuit-meal. Always try and vary the food, as the chicks will relish a changed diet and grow bigger more rapidly. Boiled rice with a little bone meal and oatmeal soaked in hot water are good for them. At the end of a couple of weeks give them some small grain. Panicum, buckwheat, and wheat cracked small will be eagerly picked up by them. See that there is always a plentiful supply of clean water for them. Never coddle them. Let them have plenty of fresh air. If they are kept in, keep them in a large yard, and do not forget to move the coop to a fresh spot every day, as nothing taints the ground quicker than chickens. Green food in the form of lettuce, chopped cabbage, garden refuse, and onions chopped fine should be given every day. Fowls have no teeth, so that they cannot masticate their food. The want of teeth must be supplied by grit of some kind. Fine gravel, pounded oyster-shells, and pounded glass are good material for grinding the food in the gizzard. Do not give your fowls much maize. Maize is too fattening, and fat fowls become lazy, and do not lay well. Always keep fowls busy. Scatter grain amongst barnyard litter, and let them scratch for it. The hardest workers are always the best layers. See that they have plenty of shade and a warm shelter to run to in cold, windy, or rainy weather. Provide them with a dust bath. It keeps the birds clear of vermin.

Here are a few things you cannot do. You cannot expect eggs from over-fat hens. You cannot make a profit from mongrel hens, nor from unhealthy fowls can you expect healthy chickens, nor many eggs from an old lazy hen.

Without grit, green food, and animal food you cannot expect your fowls to be healthy. You cannot expect good profit from them unless you feed and care for them properly.

In this small book, I cannot go very deeply into the subject of poultry-raising; but I think I have said enough to put you on the right track, and you can afterwards gain more information from other sources. I will now give you a list of diseases which poultry are liable to, and the causes of them :—

Roup : Planted by "only a neglected slight cold."

Cholera : Caused principally by over-crowding.

Diarrhœa : Damp houses, filthy houses and runs, and bad feeding.

Canker : Dampness and filth.

Diphtheria : From roosting in draughts and damp houses.

Ulcerated Throat : From roosting in draughts and damp houses.

Consumption : Neglected cold.

Apoplexy, Vertigo, and Epilepsy : Overfeeding.

Sore Eyes : Damp houses.

Costiveness and Constipation : Improper food.

Soft and Swelling Crop : Overfeeding.

Indigestion and Dyspepsia : Overfeeding.

Pip and Bronchitis : Damp quarters.

Black Rot : Result of indigestion.

Soft Eggs : Overfeeding.

Gout, Rheumatism, and Cramp: Damp houses.

Leg Weakness: Inbreeding and overfeeding.

Bumble Foot: High perches.

Scaly Legs: Filthy and damp quarters.

Egg-bound: Due to temporary derangement of the oviduct, abnormal size of the egg, or in some cases to malformation.

Inflammation of Bowels: Due to too long-continued stimulating food, overfeeding, and intestinal worms.

Gapes: Caused by worms in the windpipe.

Lice: Due to non-removal of droppings.

Recently a common trouble among fowls, especially on farms, has shown up—viz., sudden and unaccountable death. Often in the morning they are found dead under the roosts without any apparent cause. The sudden demise of poultry in this manner is attributed to apoplexy, and the numbers dying from the disease will depend largely upon the condition of feed and the care they get. It is either caused by a weak state of the bloodvessels of the brain, or so great a pressure upon them that they break, letting the blood into the brain. Fowls that are over-fat are liable to this disease, and the extreme heat of summer is also responsible. The bird is seldom noticed until dead. A remedy is to reduce the flesh and remove the conditions which cause it. Feeding little grain and other food and letting the hens run out on grass runs is a good remedy, being careful to feed neither corn nor fat meat.

The remedy for roup is, first, to isolate the bird, as roup is contagious. Put it in a warm roomy pen about 3 feet square. Wash the affected parts with warm water, syringe the nostrils with warm water or oil and a little carbolic acid—say, 1 in 60 parts. Many use kerosene with success, but this is a case of kill or cure. Sprinkle powdered chlorate of potash or sulphur down the throat once or twice a day, and swab out the throat with a feather, using diluted Condy's fluid. Keep the bird up by feeding on soft food—bran and pollard, or oatmeal and gravy. Give a teaspoonful of sulphate of iron to every quart of drinking water. If a bird is very badly affected, the best thing to do is to kill it.

When a hen is egg-bound, foment with hot water and administer a tablespoonful of warm treacle.

For inflammation of the bowels (*enteritis*), give a grain each of opium and calomel occasionally, after first giving a little salad oil and an injection of salad oil. Bread and milk should form the sole diet.

Scaly legs are caused by a kind of mite. Do not apply kerosene; it is too severe, and may lame a bird. The best way is to soak the legs in warm water for five minutes, and then rub with a stiff brush. After that, rub in a mild arsenical wash or sulphur ointment made of 10 parts lard, 3 parts sulphur, and 1 part crystallised carbolic acid. A cure will be effected in three or four days.

Gapes may be cured by administering one teaspoonful of turpentine and one of assafœtida in a warm bran mash to each twenty-five birds. A camphor pill about the size of a wheat grain pushed down the throat has often given good results.

For lice, the dust bath and the use of tobacco dust for the house with powdered sulphur are good remedies. Spray all roosts and boxes with a hot kerosene emulsion.

Cholera there is practically no cure for.

For the treatment of other diseases I must refer you to standard works on poultry, as space will not allow me to enlarge on the subject.

There is one thing I should have mentioned, and that is the value of green bone, fresh cut. It makes excellent bone-food, and is a general invigorator and growth-forcer. The results of bone-feeding are seen in a very few days in the renewed vigour, health, and appetite, and in the increased egg production,

which is thus increased by 15 per cent. A bonecutter is not a very expensive machine to purchase, and it will not be long before it will pay for itself. In feeding bone, mix it with other food, so that each bird may get its proper share.

You know that at certain seasons of the year eggs are cheap and at other seasons they are very dear. There is no reason why you should sell your eggs at 4d. or 6d per dozen, when with a little trouble you can keep them fresh and sweet for months or until the price rises to 1s. 6d. or 1s. 9d. per dozen.

There have been many kinds of preservatives tried, but only two have proved completely successful. Those two are WATERGLASS and LIMEWATER.

Waterglass is silicate of soda, which is easily dissolved in water, and is worth in Queensland about 3d. per lb.

The solution consists of 1 part waterglass to 20 parts by measure of water (not by weight). To make the pickle, boil 2 gallons of water, and when cool add 1½ lb. waterglass, stirring it well. A 4-gallon kerosene tin will hold from 16 to 18 dozen eggs and 1½ gallons of pickle, the gallon costing about 3d.

The limewater preservative is from my own experience the best. To make it, slake 3 lb. of fresh lime in 3 gallons of water. Let it stand for 24 hours, stirring well occasionally. Then, when well settled, draw off the clear liquid into a kerosene tin or stone jar. Some people add 12 oz. of salt, but this is not needed; indeed, it is injurious. Into this clear liquid put your eggs every day. See that all are fresh laid, and that none are cracked or damaged in any way, or they will spoil the rest. You may safely leave them in this pickle for 6 months. I kept some for 11 months, and they were still good. They are all the better for occasional turning, to prevent the yolks from dropping to one side.

DUCKS.

Ducks are hardy and profitable birds to breed. Once they are full grown they require little care beyond housing and proper feeding. It is the young ducklings which require constant attention. Of the utmost importance in the rearing of ducklings is the food supplied to them, as the great object is to force them on at the greatest rate with the least amount of expense. In the Aylesbury district in England ducks often attain a weight of 5 or 6 lb. in eight weeks.

For the first few days after hatching they are fed upon hard-boiled eggs chopped up finely, and mixed with breadcrumbs or biscuit-meal. It should be moistened with skim milk or water, as ducks require their food in a moist but not sloppy state. After three days of this feeding, boiled rice is given to them, and also barley-meal. Barley-meal is rather too heating alone, but when mixed with toppings it forms an excellent food. Referring to the rice, it is useless to give it to the ducklings in a raw state, but it should be cooked in order that it may be more easily assimilated by the birds. The correct way to prepare it is as follows:—To 1 pint of chicken rice add 3 quarts of water, and allow this to simmer, not boil, until the rice has absorbed all the water, and an excellent rice pudding will be made. For the last three or four weeks before killing, the rice will form the staple food, and before this time it should be given alternately with the barley and toppings. Rice has the further advantage, besides being an excellent food, of being very cheap; thus there is no better or more suitable food for rearing ducklings upon than this.

For the first fortnight the ducklings should be fed four times a day, and after this period three times will be sufficient. The meals should be given at regular intervals, the first taking place about 6·30 in the morning, the second about midday, and the third about 5·30 or 6 o'clock. The food should be given in troughs, and should remain before them for about twenty minutes, when it should be removed, and the birds allowed no more till the next time of feeding. It is a bad plan to allow birds of any description to have food always before them; and it is much better, and the birds will be found to thrive better, if the plan just advocated is adopted. Ducklings should also have a plentiful

supply of fresh water to drink, but this should be only given to them after meals. The birds should be allowed to eat as much as they will, and, when fully satisfied, may then be allowed the water to drink.

The plan that is usually adopted in the Vale of Aylesbury is to allow the ducklings to remain with the hens for three or four days, when they are removed to warm roomy sheds in lots of about forty or fifty. A large number are kept upon only a small space, as the less exercise they are allowed the faster they will grow. If the birds were to be kept for stock purposes this would be a very bad plan, as they would not grow up strong or very healthy, and, moreover, the frame would be undersized. When, however, the birds are merely to be used for killing, this does not matter, and the desire is to force them on at as great a rate as possible, without caring whether the frame is much developed. Ducklings for killing are never allowed access to water, unless it be the day prior to their being killed, when sometimes they are permitted to swim for a few hours in order to wash their feathers.

The utmost cleanliness must be observed in the duck yard, otherwise disease will soon break out.

At the large duck farm at Belmont, belonging to Messrs. Baynes Bros., there are some 4,000 birds—Aylesburys, Pekins, Muscovies, and Buff Orpingtons. Every yard, pen, and house is marvellously clean. No sloppy food is given, and all food is first boiled. It consists of liver, wheat, barley, pumpkins, lucerne, and other vegetable matter; the whole mixed with a little sand. When ready for use, there is very little moisture in it, and the birds thrive wonderfully on such diet, looking more like geese than ducks. All the ducklings are hatched in incubators. I should advise you, if you go in for ducks, to try Pekins and Aylesburys.

The Indian Runner duck is a well-shaped bird, not very large, but a wonderful layer. With a good run like a farm, these ducks will roam for long distances and almost keep themselves. They rarely attempt to sit.

Turkeys.

Turkeys will not thrive everywhere, and are more difficult to raise than any other fowls. They like high, dry land, and especially land adjoining a scrub, where they can pick up any quantity of grubs and insects, of which they are very fond. Turkey chicks are very delicate and cannot stand rain, fogs, or cold wind; therefore, never let the young turkeys get wet; the slightest dampness is fatal. Feed nothing the first twenty-four hours after they are hatched. Before putting them in the coop, see that it is perfectly clean and free from lice, and dust them three times a week with insect powder. Be sure the hen is free from lice; dust her, too. Look out for mites and the large lice on the heads, necks, and vents. Grease heads, necks, and vents with lard, but avoid kerosene. Nine-tenths of the young turkeys die from lice; remember that. Filth will soon make short work of them. Feed on clean surfaces. Give water in a manner so that they can only wet their beaks. The first week feed a mixture of one egg (beaten) and sifted ground oats, mixed, with salt to taste, and cooked as bread; then crumble for them, with milk or curds, so that they can drink all they want. Feed every two hours, early and late.

Give a little raw meat every day; also, finely chopped onions or other tender green food. After the first week, keep wheat and ground bone in boxes before them all the time, but feed three times a day on a mixture of cornmeal, wheat middlings, ground oats (all cooked), and to which chopped green food is added. Mashed potatoes, cooked turnips, cold rice, and such will always be in order. Too many hard-boiled eggs will cause bowel disease. Remove coop to fresh ground often, in order to avoid filth. Ground bone, fine gravel, ground shells, and a dust bath must be provided. Finely cut fresh bones from the butcher's, with the adhering meat, is excellent. They must be carefully attended to until well feathered. Give them liberty on dry, warm days. A high roost, in an open shed which faces the north, is better than a closed house for grown turkeys. A single union of a male and female fertilises

all the eggs the hen will lay for the season; hence, one gobbler will suffice for twenty or more hens. Two-year-old gobblers with pullets or a yearling gobbler with two-year-old hens is good mating. Gobblers and hens of the same age may be mated, but it is better to have a difference in the age. Turkeys can be hatched in an incubator, and raised to the age of three months in a brooder, but only in lots of twenty-five, as they require constant care. Capons make excellent nurses for turkeys and chicks. It is not advisable to mate a 40-lb. gobbler with common hens, as the result will be injury; a medium-sized gobbler is better. Young gobblers may be distinguished from the females by being heavier, more masculine in appearance, more carunculated on the head, and by a development of the "tassels" on the breast; a little experience may be required at first. Adult turkeys cannot be kept in confinement, as they will pine away. By feeding them in the barnyard a little, night and morning, they will not stray off very far, but they cannot be entirely prevented from roaming, and the hen prefers to make her own nest.

A turkey mother is the only one among the animal creation which seems to have no respect for the wants of her young. She will eat everything within reach, even driving them away, or seizing a mouthful and running away with it where she can eat it undisturbed. Well-baked corn bread, crumbled and fed dry, is good food for little turkeys. Whatever is given must be quite dry; sloppy food almost invariably causes bowel trouble. Wheat screenings are excellent, and, as soon as the poults are old enough to eat this, all other food may be discontinued.

When the young poults are a week or two old, it is quite common for them to begin to droop. The wing feathers are seen to hang down, the eyes are closed, and a general dumpish condition exists. The turkey chirps mournfully, and is evidently sick. If neglected, death is sure to follow. An examination will reveal the presence of lice. Look for these on the head, around the vent, and at the root of the wing quills. The last-named place is a favourite haunt of the insects. Pure lard may be applied, but never use sulphur, kerosene, or other powerful agents. Insect powder is safe and sure. Sprinkle each turkey well with it every week or so all summer. To do this, call them up to you with some food. They will gather around fearlessly, then stoop down without disturbing them, and sprinkle it thickly over them as they eat.

Lice, sloppy food, and dampness are the principal causes of death in young turkeys. Turkey hens are not apt to be so lousy as common hens. When hatched by the latter, constant watchfulness is necessary to keep them free from insects, especially if allowed to remain in the hen-house. Be sure the hen is freed from lice before the eggs are hatched, and give her a good sprinkling from underneath when taken from the nest. To do this, hold her head downwards, and dust powder well into the feathers. The large striped louse will be found on the heads and necks of young fowls almost as soon as they are hatched if there are any upon the hen. For these nothing is better than a good greasing with lard. Turkeys are perfectly hardy after the red appears upon their heads.

Geese.

You will find that geese will pay for breeding, because you have wide paddocks and fields for them to roam over, and it is in freedom in grass and cultivation paddocks that they thrive best. Grass forms more than half the food of geese and goslings. At the same time they require a good deal of attention, like all other fowls.

You should begin by getting a purebred gander and a couple of geese if you want to begin economically and breed up from these. But remember what I told you about cocks and hens—avoid in-and-in breeding, or disaster will follow. Get a new strain every year, as you will thus keep the birds' blood in good order and make their frames robust. Be careful to get healthy birds, and select good large ones with full broad breasts. Provide their nests with plenty of clean hay or straw. They will pack it up in a wonderful manner. When the young goslings appear, put them near green grass or lucerne, and

give them bran and pollard mixed, moistened, but not sloppy. They will not require much water. In a fortnight they will be taken out for long rambles by the parents, and remain away nearly all day, but they are sure to turn up again all right before dark. Geese, of course, are bred for the market; therefore give them plenty of fattening food before selling them for the table. Give bran and pollard in the morning, wheat and maize at noon and at night. Give them as much as they can eat. With a good run and healthy birds you will have very little trouble with them, and they fetch good prices at Michaelmas and Christmas.

I had intended to say something about incubators, but, should you wish to try your hand at artificial rearing, the sellers of the incubators will furnish you with printed directions how to succeed with them. So as this chapter has run to a great length, I will close it with the usual questions.

Questions on Lesson 15.

1. Show, by figures, the value of the poultry industry to a country as compared with that of the mining, pastoral, and agricultural industries.
2. Name some of the best breeds of poultry for egg-production—for table purposes.
3. What ill effects result from in-and-in breeding?
4. How should a poultry-house be built? Of what materials? Why?
5. Name some of the diseases of poultry and the remedies for them.
6. How may eggs be preserved fresh for a long time? Which is the best preservative?
7. Describe the treatment of young chickens, ducklings, turkey poults, and geese, in respect of rearing, feeding, and housing.

16th Lesson.

THIRD STAGE.

Now for a few words on the care of your farm implements. The want of care for all sorts of farm machinery is one of the greatest blots on too many farms in Queensland. You may be making a good thing out of your farm, but of what advantage is that to you if you lose your profits owing to mere carelessness? It is not always what a man *makes* on a farm that enables him to show a profit at the year's end, but it is what he *wastes* which will tell against that profit. Take machines such as reapers and binders, mowers, hayrakes, seed-drills, &c. These all cost you a large sum of money, yet they may be seen either lying in the fields on the spot where they were last used, covered with mud and rust, exposed to all weathers, and remaining unpainted from year to year; or else they are put under cover in an open shed, where they serve as hen-roosts. The best friend the agricultural implement maker has is the careless farmer. If such a man were to reckon up the losses or, rather, the money he has paid to put his uncared-for machines in order and for the purchase of new machinery, he would scarcely credit the amount he has parted with, nearly all of which might have been saved by merely erecting a rough weather-tight, fowl-proof shed, in which his implements could be safely housed every evening, and where they would be secure from bad weather. A few shillings also expended in paint and oil would save pounds in the long run. You may, in some cases, actually see plough harness slipped off the horses' backs and hung on to the plough, to remain there all night, or perhaps for days if the ground is too wet to plough. Imagine how delightful it must be when you hitch in your horses to the binder and find that the machine is all out of order—bolts loose, ironwork plugged up with rust, woodwork dried up and splitting. Then what a pleasure it is, with a 20-acre field of barley to cut, to find yourself careering round, or, as Mr. Lamb, a well-known farmer and machine-owner in the Warwick district says, wrestling with a neglected binder with a bottle of kerosene in one hand and a screw wrench in the other, trying to get the

machine to move, and at last sending for the machine man who supplies a lot of new duplicate parts or even a new machine, for which the farmer has to pay.

Now, just take the advice I here give you. Run up a shed with a few bush posts. If you have no slabs, use second-class galvanised iron for roof and sides. Fix up a good wide door—a sliding door is the best, and saves wear and tear on door and hinges, besides being out of the way of collision with any machine going in. Such a building does not take long to put up. You can work at it by moonlight if you are very busy. Put all your implements, machines, and tools into this shed when not in use. Keep them always ready for work at a moment's notice. Treat them well, and they will not fail you when you require their services.

Give them a coat of paint at least once a year. Lastly, get to know all about your machines. Study every part, and how to take them to pieces and put them together again properly. And not only study them yourself, but teach one or two of your most reliable men. Then, when any little hitch occurs, you need not send a telegram or ride 20 miles to bring out an expert in machinery. He will cost you a lot of money and time, and you cannot blame him when a big bill comes in. Looking after machinery and selling it are his business, and his time and labour and skill have to be paid for just as much as a doctor's time and skill. So do not blame the machine man, but blame your own carelessness if your machines are allowed to get into such a bad state of disrepair that his services are needed, and furthermore blame your further carelessness in not making a practical study of all the working parts of every machine you own. If you follow the advice here given, which is advice which has been given over and over again in every agricultural journal under the sun, it will mean all the difference between profit and loss.

Care of Horses.

I will suppose that you have started with two or more really good plough horses. They will have cost you anything from £15 to £30 or more each. You cannot afford to ill-treat animals like these. Even the most cruel slave-drivers in the old slavery days of the United States of America were, with few exceptions, careful not to knock-up, starve, or ill-treat their slaves during the cotton-picking season. Strong healthy slaves, costing from £80 to £100 each, were too valuable chattels to the planter to be trifled with. Your horses are your slaves, willing slaves. Treat a good horse kindly, feed him well and judiciously, do not overwork him or overtax his strength, and there is nothing in reason that he will not willingly do. A well-bred, well-trained, plough horse is the most docile and tractable of animals. Then why beat him, starve him, work him till he is ready to drop from fatigue and thirst? Why leave him standing alongside the plough with his harness on, in the blazing sun without a drink, while you and your man go to the house for dinner and a comfortable hour's spell? I have seen this over and over again on farms in Queensland. Much unintentional cruelty is practised by those in charge of working horses, especially during the hot summer. In many cases the animals are brought up at, say, half-past 5 in the morning. They may have had a drink at a waterhole or they may not, for all the ploughman knows. Then they are given a feed of dry lucerne hay, possibly some corn. Without any thought of the probability of the poor animals being thirsty, they are yoked up and worked through the whole morning until midday without being allowed either spell or drink, unless the ploughman wants a spell himself. The latter quenches his thirst from a water-bag, but never dreams that his cattle may be even more thirsty. With a refinement of cruelty, the water-bag may sometimes be seen hung to one of the hames, and the unhappy horse that carries it is tantalised by the smell and gurgling of the water of which not a drop reaches his lips. Then, at noon, the heated animals, mad with thirst, are taken to a waterhole, and are allowed to drink all they can, heedless of the possible bad effect of filling the empty stomach with a quantity of cold water.

Horses require water at frequent intervals. To let an animal drink its full at 7 a.m. and then work till noon, without any refreshment, is cruelty. If men would but pause, and think of the effect of a drink on themselves, perhaps they would have more consideration for the patient horses. The man feels thirsty after following in the dust of a harrow for an hour, and he quenches his thirst by a good drink from the bag. Now, as he gets to work again, the violent exercise causes him to perspire freely, and it is not long before the loss of moisture by perspiration requires replenishing. Then, again, he has recourse to a "quencher" from the bag. Why, in the name of humanity, can he not consider that the same causes produce the same effect on the horses? There would be little time lost if they were allowed a drink every two hours. They would work the better for it, and be less liable to internal disorders from overloading their stomachs with fluid at long intervals. I cannot too strongly impress upon you and on all men in charge of horses that the animals like to drink little, but often. The renowned Sarah Gamp used to say, "Put the bottle on the mantelshelf and let me help myself when I feel so dispoged," for which see Dickens's "Martin Chuzzlewit."

In the same way, the horses mutely appeal to their driver, "Put some water on the field and let me help myself when I am so disposed, which is at intervals of two hours."

The following advice about watering a horse is given by the *Agricultural World*:—"It has been found that a horse drinks less water in a given time if he has continual access to water in the stable than when watered at long intervals; and nothing can be said against this practice, except that the water is apt to become stale and foul by absorbing the ammonia generated from the urine, unless constantly changed. A horse should always be allowed to quench his thirst after coming in from work, even if he is hot. A very general opinion exists that it is injurious to water horses when they come in from work in a heated state, and they are, therefore, in many instances, not watered until they have somewhat cooled down; this opinion is fallacious, as it does not hurt horses to drink cold water directly they return from work. It is, however, hurtful to let a horse drink after he is partly cooled down, and this practice is very liable to cause a chill to the system. It may often be noticed that horses that have come in hot, and are not watered directly, but some time afterwards, commence to shiver after drinking a pailful of water, whereas if a horse is allowed to drink before the blood has cooled down he will not do so. The explanation of this is, no doubt, as follows:—Cold water, on entering the body, absorbs a certain amount of heat from the system, in order to bring its temperature up to the internal temperature of the animal drinking it. In the case of a horse in a hot state the loss of heat is not felt, as there is sufficient heat to spare; whereas in a horse which has already partly cooled down, and whose system has begun to flag, the sudden further loss of heat occasioned by the cold water entering the body and absorbing heat causes the system to become chilled."

As to feeding your horses, you should study well their constitution. One horse will have a good appetite and eat up all his dinner and be ready for the afternoon's work in reasonable time, while a horse with a poor appetite will take more time and pick out the best parts. This is no fault of the horse. He wants some appetising medicine. Give him something, less in quantity, but better in quality—a little bran or pollard, for instance. This will enable the weaker horse to keep up to his work. Old horses must have more attention than younger ones in the matter of food. It is unreasonable to expect old horses to do the same amount of work as younger ones on the same kind and amount of food. Remember that horses have small stomachs, so they should not be fed too much at one time. If you allow a horse to gorge himself, he will get indigestion.

Don't feed hay in the middle of the day. Give the heaviest feed at night, when he will have plenty of time to digest it. Some horses require more hay or chaff than others. Study your horse, and never feed him so that he looks

stuffed. The amount of food required by a horse varies with the speed at which he is worked. Suppose a horse to walk 12½ miles, he will do the distance comfortably on 19½ lb. of hay, but if you trot him over the same distance even 24 lb. of hay is insufficient. Scientific men have shown that a horse weighing 1,000 lb. and doing only moderate work requires but 11½ lb. of digestible food daily, but with average work he requires 13½ lb., and when heavy work is being performed 16½ lb. If in each case the animal gets 10 lb. of hay, he would require in addition 11½ lb. in an equal mixture of maize and oats in the first instance, 15 lb. in the second, and 20 lb. in the third. No draught horse should be allowed more than 12 lb. of hay or chaff in a day. Farm working horses, in good seasons, consume too much of this coarse fodder. If the hard-working horse were fed on hay alone, he would require 40 lb., but such a supply would be fatal to good results, and absurd to supply.

In concluding these remarks on feeding, bear in mind that an excellent feed for a horse doing moderate work—a horse weighing 1,000 lb.—is a mixture of 10 lb. of hay with 11½ lb. of oats, or with 10½ lb. of oats and maize in equal parts, or 8 lb. of oats and 4 lb. of bran. Barley may be substituted for oats.

Never leave your horses after they return in the evening to the stable without giving them a good rubbing down. Perhaps you have heard the maxim, that a good rub down with brush and currycomb is as good as half-a-feed. Clean them from nose to tail, and dry them off with a cloth. Look to any sores they may have, and apply liniment or ointment to them. In raw, cold weather, when your horses have to stand for any time in the wet, cover their loins with a cloth. It will prevent the risk of their catching cold. Finally, treat your horse in a degree as you would treat yourself. Feed him well, treat him kindly, don't overwork him, give him comfortable quarters, and you will not often require the services of a veterinary surgeon. It would be as well if you studied some book on veterinary science, in order at least to be able to recognise the more apparent ailments of the animal and those which will yield to the very simplest treatment. In any case of difficulty or doubt, consult the surgeon as early as possible.

Questions on Lesson 16.

1. Why should every care be bestowed on agricultural machinery and implements?
2. What particular care do they require?
3. Why should you make yourself perfectly acquainted with the various parts and the construction of agricultural machinery?
4. How ought horses on the farm to be treated?
5. At what hours should a horse doing moderate work be allowed to drink?
6. State generally the effects of allowing a horse to drink—(*a*) when he comes in hot from his work; (*b*) when he has cooled down a little. Give your reasons.
7. What rules should be observed in feeding old and young horses?
8. How much food does a horse require daily when doing moderate work?
9. Why should horses not be fed on hay alone?
10. What should be first attended to after stabling the horses when the day's work is over?

17th Lesson—Conclusion.

THIRD STAGE.

We have now reached the close of these elementary lessons in Agriculture and its adjuncts in the shape of dairying, pig and poultry breeding, and farm-horse management. As I told you at the beginning of our lessons, they are only meant to put you in the right road to success. Having mastered what I have tried to tell you in simple language, you will be quite half-way up the ladder; and with the experience you have gained by the study of more advanced text-books on Agriculture, and by the perusal of articles in high-class agricultural

journals, you will ere long reach the top, when it will depend upon your energy almost as much as on the seasons to make or mar your future life Do not think because you see some beautiful crops of lucerne, wheat, potatoes, sugar-cane, tobacco, maize, or anything else, that this is the general state of things. You will have a desperate war to wage with all kinds of enemies. Some of these are drought, the most terrible enemy of all; floods, although causing temporary loss, still beneficial on the whole; insect pests, fungus pests, scales, flies, worms, slugs, caterpillars, birds, rats, wallabies, bandicoots; but I may as well curtail the list or you may be deterred from Agriculture altogether. Still it must be mentioned that whilst the crops are subject to so many trials your live stock will also contract ills, many of which, however, you may guard against by care and cleanliness in byre, stye, and stable. Most of the diseases incidental to plant life may be either prevented or mitigated; and if the plants are attacked by any particular insect or fungus, these can be got rid of in various ways.

For instance, wheat and barley are liable to a disease called smut, to another called bunt. These can be almost entirely prevented by steeping the seed in a solution of bluestone or, as it is called, sulphate of copper: 1 lb. bluestone to 6 gallons of boiling water. This will dress 448 lb. of seed, and smut will not appear in the crop.

The vaginula slug attacks cabbages, cauliflowers—in fact, all the cabbage family. They are easily destroyed by sprinkling lime about the beds, or, still better, by the use of tobacco dust, which is certain death to them. Caterpillars are more difficult to deal with, especially when they attack the wheat and barley fields, where little can be done to stop their ravages. Fortunately they are not frequent visitors. Wallabies must be fenced out with palings or wire netting. Sprays of various kinds and cyanide gas are used for scale insects and aphis on fruit trees, and sprays on vegetables.

Worms on tobacco plants are usually removed by hand, and it is a very troublesome business. The boll worm of the cotton plant is very destructive, and, like the barley caterpillar, is hard to destroy. Fruit-eating birds require to be guarded against by light nets thrown over the trees. Flying foxes, which are so destructive to fruit, are a serious pest. In a small orchard it is said that a few skeins of worsted twisted round the trees will keep them off, but this would be impracticable in a large orchard; hence great losses, especially of peaches and plums, are sustained, and no remedy has yet been devised beyond tracing the foxes to their camps in the scrubs and shooting them down. However, I need not detail all the diseases and pests of plants and the remedies for them. These would entail a fourth book, which I shall put into your hands on a future occasion. In the meantime, any information on these subjects can be obtained either from the numerous works on plant diseases and insect pests, or by questions sent to the editors of agricultural and horticultural papers.

It remains only to instruct you in the times and seasons for sowing and planting. The months here given will not apply equally to all parts of the State. We have, in Queensland, at least three different climates. First, there is the hot, steamy, North coast, where the rainfall is excessive, and where the great heat of summer is only tempered by the sea breezes, and where the so-called winter is of very short duration. West of this and above the coast range, there is on the contrary a delicious climate, rather hot in summer, but enjoying a long cool winter and a good rainfall. Here the seasons for planting are always in advance of those in the South, so that anything which cannot be sown or planted in the South until the end of August or the beginning of September may there be sown in July.

Next we have the Central district, with a more equable climate both on the coast and inland, with an average rainfall of between 40 and 50 inches. More towards the West, however, the rainfall is considerably less, but in fair seasons is ample for wheat-growing and general agriculture. Here, also, the seasons for planting are in advance of those in the South.

The seasons are more distinctly marked between the South-eastern coast and the country west of the Main Range, from Toowoomba towards Warwick and Stanthorpe, in which latter districts severe frosts occur, often early in the autumn and late in spring, whilst below the Range the climate is more temperate. These Southern and Western districts are admirably adapted by climate, soil, and rainfall to general agriculture, and it is for these parts that the following table is given For the more Northern districts, as before said, the dates must be advanced by at least a month, except in the case of cotton-planting, the time for which must be so arranged as to secure the ripening of the crop after the wet season, which occurs generally from January to April:—

When and How to Sow and Plant.

Taking the principal crops grown in Queensland, Sugar-cane may be planted from August to November, using tops preferably to other parts of the cane. There should be four buds in each plant. Lay them with the buds on each side in a furrow 1 foot deep, and cover with an inch or two of soil. As the shoots grow, fill in the furrow. Cane should be planted in rows 6 feet apart with a distance of 3 feet between the plants. As the canes grow, take off all dead leaves. This is called trashing. It helps to ripen the cane, to increase the density of the juice, and to allow a free circulation of air through the field. It also prevents the shooting of the buds in continuous wet weather. Keep the cane trashed up to harvest time. When the cane is off, don't burn the trash, but plough it in. The lost fertility of many of the cane-fields is due to the want of humus. This want is supplied by the buried trash. The harvest begins about August, but if frosts occur, the mills begin earlier. If you do not get more than 20 tons of cane to the acre, find out what is wanting in the soil and remedy it. You will find the causes to be want of manure and of water. Keep down the cane grub as much as possible.

Maize should be planted in rows 6 feet apart, the plants 3 feet apart. You may sow with a drill regulated to a closer distance, dropping one seed at a time. If you sow by hand, put three seeds in each hole. Sow from August to January. Keep the crops th roughly clean. Work your Planet Junior until the horses can no longer pass up the rows without damaging the stalks. Remove all suckers and collect them for your dairy stock. The crop will be ready for pulling in from four to six months after sowing, according to the variety of corn sown. Do not be satisfied with less than 50 or 60 bushels per acre. With good soil, cultivation, and weather, the crop should reach 100 bushels. Let it get thoroughly dry in the barn before threshing. Do not burn off the cornstalks. Take a lesson from the great drought of 1901-02, when dry maize stalks were used with success as feed for all kinds of stock.

Wheat.—Sow broadcast or in drills, preferably the latter. Sow in the South of the State from March to June; in the North in May. If the young wheat is very rank, eat it down by means of a flock of sheep. Rolling it when it is 6 or 8 inches high has the effect of preventing it "lodging," and will enable it to stand up against high winds. Always steep the seed wheat in a solution of bluestone, as described above. If the young wheat in the ear is slightly frosted, do not be in too great a hurry to cut it down. It may recover, as happened here in 1901. The harvest begins in November, and ends in January.

Barley.—Sown, like wheat, between May and June Cut it before it is dead ripe, or you will suffer loss by the grain shaking out. Stook it on the field, and when *quite dry* stack it. If barley is not dry when stacked, it will heat and become mow-burnt. It should be kept a couple of months in the stack before threshing. When barley is about 3 inches over the ground, run the roller over it. Never neglect this. It acts as a soiling, strengthens the straw, makes the growth more regular, and gives a more even surface for the machines to work over. If it comes too rank, feed it off, but be very careful not to feed off too closely, and keep stock off it in wet weather.

OATS.—Sow broadcast or in drills in March and April. There is little trouble in producing a crop of oats either for green feed, ensilage, or hay. For hay, cut the crop when the grain has passed the milk stage. Cut it when still slightly green. Do not expose it too long to the sun. Stack for a short time, then bale or chaff it as required.

LUCERNE.—The sooner you can get in a field of lucerne, the better. Prepare the ground thoroughly. Plough deeply. Harrow down. Plough again. Harrow down to a fine tilth. Sow only the broad-leafed variety, broadcast or in drills 12 inches apart—drills for preference, as you can thus keep the young plants clear of weeds. Sow from March to July. Cut every six weeks, weather permitting, when *one-third in blossom.* If you leave cutting till later, there will be a marked diminution in quantity and quality. It is a good plan with a poor stand of lucerne to disk-harrow it, setting the disks at as great an angle as possible. Then cross-disk it. The lucerne will afterwards branch out thickly; 10 lb. of seed per acre is sufficient. Lucerne is sometimes attacked by a parasitic plant called DODDER. You will recognise it by its creeping, hair-like tendrils, which grip and squeeze the life out of the plant. It always appears in patches like ringworm. To get rid of it, cut the patches affected as close as possible to the ground, and carefully remove every particle. It is, indeed, better to burn it where it lies after cutting. Then cover the patch (if the dodder and lucerne have been removed) with about 6 inches of dry grass. This effectually chokes the dodder, but the lucerne will grow through it. By this plan, there is no need to dig up the lucerne plants, but the mulch must be removed when you are about to mow to prevent entanglement in the machine. Be careful to make the hay quickly. If you dawdle over it and wet comes on, the leaves fall off and the value of the crop is a vanishing quantity. Cure your hay green. If continuous rain occurs when you have a quantity cut in the field, put it into the silo. Thus nothing will be lost.

POTATOES.—Of these you will get two crops in the year. In fact, it is quite possible to have new potatoes all the year round, but that requires intense cultivation by the market-gardener. Plant in drills 2 feet 6 inches apart, and put the sets from 12 to 14 inches apart in the rows. In dry districts plant on the flat; in wet districts the ridge system is preferable. From 10 to 12 cwt. of seed are necessary to plant an acre. Keep the crop clear of weeds, and when the tops are 8 or 10 inches high earth them up either with the hand hoe or the moulding plough. Sow in February and March, and again in September.

SWEET POTATOES.—Plant cuttings of the vines on ridges in rows 4 feet apart, leaving from 12 to 20 inches between the cuttings. Plant in September. They will require little attention, as the vines soon cover the ground. Sweet potatoes may be kept for a long time if placed in heaps with plenty of dry sand between the layers, and covered to prevent the intrusion of rain water.

MANGOLDS.—Sow in August and September, in drills 3 feet apart. When the root is about the size of a pigeon's egg they must be singled—that is, thinned—out to a distance of 18 inches apart. Keep the Planet Junior horse hoe going at least three times during the growth. The crop will take about seven months to mature. If you want to plant out mangolds (or mangels, as some people call them), cut off the tops about 4 inches from the roots. Plant them firm in the ground, but not too deep, as the crown of the root should not be covered.

IMPHEE, KAFIR CORN, SORGHUM, and TEOSINTE may all be sown in drills from August to January. They call for no special directions. Sow the seed, keep the weeds down for a time, and harvest green for ensilage or fodder. Sorghum is said to be poisonous at a certain stage of its growth if cows or horses are allowed to graze on it. Cut the sorghum, allow it to wilt for a time, and no bad results will follow from its use.

COTTON.—This crop, which many years ago was a universal one in Queensland, is once more coming to the front. There are many varieties of cotton—

the finest is Sea Island. Other varieties are known by the generic name of Egyptian or Uplands. You can always distinguish Sea Island cotton from Uplands because the former has black, clean seeds free from adhering lint. Some varieties have seed which takes the form of a mulberry, all the seeds clinging together in the centre of the boll. The Egyptian or Uplands seed is grey, and the short lint adheres closely to it. Sow cotton in September. In the North I think it should be sown much earlier, in order to have the harvest before the wet season in January. Cotton seed, in the olden days, was a mere drug on the market, and was generally turned into manure. To-day it has a large market value, and therefore you cannot afford to be so lavish in sowing it as we were thirty years ago. There are drilling machines which will sow cotton seed exactly in the same manner as those which sow maize. The rows should be—For Uplands cotton, 5 feet apart; for Sea Island, 6 feet is not too wide, with from 4 to 6 feet between the plants for each variety. Pick cotton after the dew has evaporated. Let it dry on sheets before bagging it. When picking, be careful about dropping any on the ground, because, in picking it up, you will pick up gravel and stones which adhere easily to the lint, and these constitute a source of danger in the gin-house, owing to the almost certain striking of fire when the stones meet the rapidly revolving saws of the gin. The gin-house is full of floating particles of cotton, and these ignite with the slightest spark.

Cowpeas.—This is the last field crop I shall mention, except Pumpkins, which I will here dismiss by advising you to sow them at 20-yard intervals in your maize-fields at the same time as the corn. The plants require no attention. As to cowpeas, these are sown principally for green manure, although the vines make excellent chaff and ensilage. Sow in September in the South and in January in the North, in drills 3 feet apart, and thin out to 1 foot in the rows. If wanted for manure, plough under about the flowering time, using a chain on the plough to press them down so that the sod will cover them.

There is a great deal more to tell you about the orchard, the vegetable garden, and small fruit-growing. These will more fitly form the subject of a separate series of text books. Meanwhile, I close this series with the hope that I may have been instrumental in assisting young farmers to avoid the mistakes which I myself have committed in the olden days of Queensland farming, and in putting them into the straight path which leads to success. Needless to state that what I have written in these three little books is not all my own experience. I am indebted for much that is here laid down to authorities in all parts of the world, and very much so to the Press of Australasia, of the United States of America, and of the British Empire generally. I have also received great assistance from Mr. Peter McLean, Agricultural Adviser to the Department of Agriculture. It remains only to wish success to my readers, and to say *Floreant Agricolæ*—may the farmers flourish.

APPENDIX.

USEFUL RULES AND TABLES.

HOW TO MEASURE AN ACRE.

5	yards	wide	by	988	yards	long	contain	1 acre.
10	”	”	”	484	”	”	”	”
40	”	”	”	121	”	”	”	”
70	”	”	”	$69\frac{1}{2}$	”	”	”	”
80	”	”	”	$60\frac{1}{2}$	”	”	”	”
60	feet	wide	”	726	feet	”	”	”
110	”	”	”	397	”	”	”	”
130	”	”	”	363	”	”	”	”
220	”	”	”	$181\frac{1}{2}$	”	”	”	”
440	”	”	”	99	”	”	”	”

70 yards by 70 yards is easily calculated.

This gives 4,900 square yards, whereas an acre contains 4,840 square yards, a difference of 60 square yards.

HOW TO MEASURE A STACK.

To Find the Content of a Round Stack.

Where very great accuracy is not required, the content is sometimes found by taking the height of the stack from the ground to the eaves, and adding to this the third of the height from the eaves to the crown—the sum of these by the mean girth gives the cubic content.

The content thus found is less than the truth, but the loss is not great, seeing that the stack is not so dense at the top as at the bottom.

To Find the Mean Girth when the Stack Tapers Regularly to the Eaves.

Add together the girth taken at the bottom of the stack and the girth taken at the eaves, both in feet; then half the sum is the mean girth. When the stack does not taper regularly, girths must be taken in several places and added together, and their sum divided by the number of girths taken; the quotient is the mean girth. Then, with the mean girth found in one of these ways and the height of the stack from the ground to the eaves, find the content of this portion of the stack.

Next find the content of the top portion or roof by taking the girth at the eaves multiplied by the perpendicular height from the eaves to the crown of the stack, the third part of which is to be added to the content of the body portion already found, and their sum shows the content of the stack in solid yards and feet.

Example:—Required the solid content of a circular stack, the girth at the bottom being 56 feet, the girth at the eaves 63 feet, the perpendicular height from the ground to the eaves 12 feet, and the perpendicular height from the eaves to the crown of the stack 9 feet.

Content of the Lower Portion of the Stack.

Add together the two girths, 56 and 63 = 119, half of which is $59\frac{1}{2}$ feet—the mean girth.

Square this mean girth, and we have—

$$59{\cdot}5 \times 59{\cdot}5 = 3{,}540{\cdot}25, \text{ which is the area of the base.}$$

Now multiply this area by 10, and divide by 125 (or multiply by ·08 or roughly by $\frac{1}{12}$)—

$$3{,}540{\cdot}25 \times 10 = 35{,}402{\cdot}5 \qquad 35{,}402{\cdot}5 \div 125 = 283{\cdot}2.$$

Multiply this by the height of the stack (12 feet)—

$$283{\cdot}2 \times 12 = 3{,}398{\cdot}4 \text{ cubic feet;}$$

which, reduced to cubic yards (27 cubic feet = 1 cubic yard), gives us 125 cubic yards as the solid content of the lower portion of the stack.

We now have to calculate—

The Content of the Roof.

Square the girth at the eaves (63 feet)—

$$63 \times 63 = 3{,}969.$$

Multiply by 10—

$$3{,}969 \times 10 = 39{,}690.$$

Divide by 125—

$$39{,}690 \div 125 = 317{\cdot}52.$$

Multiply by $\frac{1}{3}$ of the perpendicular height of the roof (9 feet): $\frac{1}{3}$ of 9 = 3. Then, $317{\cdot}52 \times 3 = 35{\cdot}28$ cubic yards.

Thus the whole stack is shown to contain—

In the lower portion	125 cubic yards
„ upper „	$35\frac{1}{4}$ about
	$160\frac{1}{4}$ cubic yards

To Calculate the Content of an Oblong Stack.

Suppose our stack to have the following dimensions:—Length, 50 feet; breadth at the eaves, 17 feet; at the bottom, 12 feet; perpendicular height from the ground to the eaves, 13 feet; and from the eaves to the ridge of the stack, 7 feet. The following calculation will give the contents in cubic feet:—

Get the mean breadth by adding together the breadth at the eaves and the breadth at the base, and divide by 2. That is—

$$\frac{17 + 12}{2} = \frac{29}{2} = 14{\cdot}5, \text{ the mean breadth.}$$

Multiply by the vertical height (13 feet):—

$$14{\cdot}5 \times 13 = 188{\cdot}5 \text{ square feet, area of lower portion.}$$

For the roof, multiply the breadth at base of eaves by half the perpendicular height from eaves to ridge.

$$17 \times 3\cdot5 = 59\cdot5 \text{ square feet, area of roof.}$$

Add the two areas together, and multiply by the length of the stack, and we get the cubic content as follows:—

$$188\cdot5 + 59\cdot5 = 248 \times 50 = 12{,}400 \text{ cubic feet,}$$

or nearly 460 cubic yards. The hay in such a stack would weigh, perhaps, 150 lb. per cubic yard (but this is a very variable quantity); hence, the total weight of hay would be about 24½ to 25 tons. If it is a wheat stack, you may take a cubic yard to represent 1 bushel of grain. The stack should thresh out 460 bushels. But these weights are merely approximate, as both hay and grain vary largely in weight.

To Calculate the Weight of Hay in the Stack.

Hay, as I have said, necessarily varies in weight, according to quality, size of stack, age, &c. New hay may weigh 112 or 140 lb. When the stacks are ten or twelve months old, the cubic yard may weigh 14, 16, 18, and as much as 20 stones.

Taking 140 lb. as the weight of a cubic yard, such a stack as I have described would contain 22,400 lb., or 10 tons.

The Quantity of Grain in the Stack

may be estimated at the average quantity of 1 bushel to the solid yard.; but if the crop has been mown, a yard will not average more than three-quarters of a bushel.

Stacks of Straw

are reckoned, on an average, at the rate of 18 to 20 cubic yards to the ton.

Content of Silos.

A building 20 feet long, 12 feet broad, and 10 feet high to the eaves, with an additional height of 6 feet from the eaves to the ridge, will contain 2,880 cubic feet. If all the dimensions of the building are doubled, it will hold 24,960 feet of silage.

HOW TO MEASURE CORN IN THE BARN.

The following rule will apply to a barn or crib of any kind:—

Two cubic feet of sound dry corn in the cob will make a bushel of shelled grain.

To get at the quantity of shelled grain in a crib of cobs, measure the length, breadth, and height of the crib. Multiply the length by the breadth, and the product by the height. Then divide the product by 2, and you have the number of bushels in the crib.

Example:—Your crib or barn is 20 feet long, 10 feet broad, and 8 feet high. This is packed with husked corn—

$$20 \times 10 \times 8 = 1{,}600 \text{ cubic feet.}$$

Divide by 2, and you get 800, the number of bushels of shelled grain in your barn.

Suppose you want to calculate

THE NUMBER OF BUSHELS OF POTATOES IN A PIT.

Multiply the length, breadth, and depth of the pit together, and divide by 8.

You will notice that all these calculations are very simple, and are based on getting the number of cubic feet or cubic yards in stack, silo, barn, crib, or pit. If you know the weight of the cubic foot or yard, you can easily arrive at the rest.

NUMBER OF SPLIT RAILS PER CHAIN (22 YARDS) REQUIRED FOR A TWO-RAIL FENCE.

Length of Rail.	No. of Rails.	No. of Posts.
9 ft. 6 in.	14	8

Question:—Supposing that you have a 3-rail stockyard, 10 panels long and 2 panels wide, how many rails and posts would it take to make it double the size? Answer: 12 rails and 2 posts.

WEIGHTS OF FARM PRODUCE.

Maize,	56 lb. to bushel.	Clover,	60 lb. to bushel.
Oats,	40 ,, ,,	Flax (linseed),	60 ,, ,,
Bran,	20 ,, ,,	Grasses (mixed),	20 ,, ,,
Pollard,	20 ,, ,, 2,000 lb. per ton.	Imphee,	40 ,, ,,
		Prairie grass,	20 ,, ,,
Wheat,	60 ,, ,,	Perennial rye grass,	20 ,, ,,
Cape barley,	52 ,, ,,	Peas,	60 ,, ,,
Malting barley,	50 ,, ,,	Rye,	60 ,, ,,
Potatoes,	2,240 ,, per ton or 112 lb. per cwt.	Rib grass,	60 ,, ,,
		Sorghum,	40 ,, ,,
Hay,	2,240 ,, ,,	Lucerne,	60 ,, ,,
Chaff,	2,240 ,, ,,	Panicum,	60 ,, ,,
Bran,	2,000 ,, ,,	Beans,	60 ,, ,,
Flour,	2,000 ,, ,,	*Paspalum dilatatum*, about	10 ,, ,,
Buckwheat,	50 ,, to bushel.	Rice,	60 ,, ,,
Couch grass	40 ,, ,,		
Cocksfoot,	20 ,, ,,		

TABLE showing the NUMBER of FOREST TREES required to PLANT a MILE in LENGTH from 10 to 100 feet apart.

Distance.	Number per Mile.	Distance.	Number per Mile.	Distance.	Number per Mile.
100	52	65	81	30	176
95	55	60	88	25	211
90	58	55	96	20	264
85	62	50	105	15	352
80	66	45	117	10	528
75	70	40	132		
70	75	35	151		

NUMBER of PLANTS required to PLANT ONE ACRE of LAND, from 1 foot to 30 feet from PLANT to PLANT.

Distance Apart.	Number per Acre.	Distance Apart.	Number per Acre.	Distance Apart.	Number per Acre.
30	48	14	222	5	1,742
28	55	13	257	4½	2,151
26	64	12	302	4	2,722
24	75	11	360	3½	3,556
22	90	10	435	3	4,840
20	100	9	557	2½	6,970
19	120	8	680	2	10,890
18	134	7	889	1½	19,360
17	150	6½	1,031	1	43,560
16	169	6	1,201		
15	193	5½	1,440		

Fourteen thousand strawberry plants will plant 1 acre, if planted 3 feet apart in the rows at a distance of 12 inches between the plants.

The number of plants to the acre also depends on whether they are set to form squares or equivalent triangles, as shown below :—

Distance Apart.	Number per Acre.		Distance Apart.	Number per Acre.	
	Square.	Triangle.		Square.	Triangle.
1 foot	43,650	50,300	12 feet	302	348
2 feet	10,890	12,575	14 ,,	222	256
3 ,,	4,840	5,889	15 ,,	193	222
4 ,,	2,722	3,143	16 ,,	170	191
5 ,,	1,742	2,011	18 ,,	134	164
6 ,,	1,210	1,397	20 ,,	109	125
7 ,,	888	1,025	25 ,,	69	79
8 ,,	980	785	30 ,,	48	55
9 ,,	537	620	35 ,,	35	40
10 ,,	435	502	40 ,,	27	31

When the distances between the plants differ from that between the rows, divide 43,560, the number of square feet in an acre, by the number of square feet to each plant, and the quotient will be the number of plants to the acre. The square feet to each hill is found by multiplying the number of feet between the rows by the number of feet, or fraction of a foot, between the plants.

NUMBER of PIPES required for THOROUGHLY SUB-DRAINING an ACRE of LAND.

Length of Pipe.	Distance Apart of Drains.	Number of Pipes.	Length of Pipe.	Distance Apart of Drains.	Number of Pipes.
Inches.	Feet.		Inches.	Feet.	
12	10	4,356	12	17	2,562
,,	12	3,630	,,	18	2,423
,,	15	2,904	,,	20	2,178

AMOUNT OF FARM AND GARDEN SEEDS REQUIRED PER ACRE.

It may be of advantage to you who have only lately settled on the land, and particularly to some of my readers who may have entered on the business for the first time in Queensland, to know how much seed to purchase for sowing or planting various crops. Although there are cetain crops which may practically be sown and raised all the year round in this favoured climate, yet the regular seasons for most crops are quite as clearly defined as they are in other colder or hotter countries. Some modification of the times for sowing and of the amount of seed to sow will have to be made in different parts of the State owing to the wide range of temperature and rainfall, and to the variety of soils and their aspect. But, as a general rule, the following will be found fairly correct, the quantities in all cases being per acre:—Barley, broadcast, 1 to 1½ bushels; drilled, ½ bushel. Beans (broad), drilled, 1½ bushels; (French), 1⅓ bushels; (horse), 2 bushels. Beet (drilled), 5 lb. Buckwheat, broadcast, 1 to 2 bushels. Cabbage (field), in seed beds, 2 lb. Carrots, drilled, 5 to 7 lb. Clover, broadcast, 12 to 20 lb. Grasses, prairie, 1 bushel; Italian rye, 4 bushels; perennial rye, 2 bushels; rib, ½ bushel; couch, ½ bushel; permanent mixed pasture, 3 bushels; imphee, 20 lb.; kohl-rabi, drilled, 2½ lb. Lucerne, broadcast, 20 lb.; drilled, 10 lb. Maize, broadcast, 3 bushels; drilled, ½ bushel. Mangolds, drilled, 5 to 6 lb. Millet, broadcast, 1 bushel. Oats, broadcast, 2 bushels. Onions, broadcast, 5 lb.; drilled for setts, 20 lb. Panicum, broadcast, 20 lb. Parsnips, drilled, 8 to 10 lb. Peas, broadcast, 3½ bushels; drilled, 2 bushels. Potatoes, 14 cwt. of cut setts; if planted with the American potato planter, 10 cwt. Rye for grain, broadcast, ¾ bushel. If for saddlers' use, 1½ bushels. Sorghum for grain in drills, 10 lb.; broadcast for green fodder, 20 lb. Swedes, 3 lb. to 4 lb. Turnips, globe and yellow, drilled, 2 lb. Vetches, broadcast, 3 bushels. Wheat, broadcast, 1 to 1½ bushels; drilled, ¼ bushel. Paddy (rice), 30 to 40 lb. Cow pea, 8 lb. Jerusalem artichoke, 3 to 4 cwt.; *Paspalum dilatatum*, 10 lb.

AMOUNT OF BARBED WIRE REQUIRED FOR FENCES.

The estimated number of pounds of barbed wire required to fence the spaces or distances below mentioned with one, two, or three lines of wire, based upon each pound of wire measuring 1 rod (16½ feet), is as under :—

Distances.	1 Line.	2 Lines.	3 Lines.
	Lb.	Lb.	Lb.
1 square acre	50⅔	101⅓	152
1 side of a square acre	12⅔	25⅓	38
1 square half-acre	36	72	108
1 square mile	1,280	2,564	3,840
1 side of a square mile	320	640	960
1 rod (5½ yards) in length	1	2	3
100 rods (550 yards) in length	100	200	300
100 feet in length	6 1/16	12⅛	18 3/16

HOW TO CALCULATE THE WEIGHT OF LIVE STOCK.

1. Find the girth in inches at the back of the shoulders, and the length in inches from the square of the buttock to a point even with the point of the shoulder blade.

2. Multiply the girth by the length and divide the product by 144. Then multiply the result by the number of pounds per superficial foot for cattle of different girths; the product of this will be the number of pounds of beef, veal, or pork in the four quarters of the animal.

3. For cattle of a girth of from 5 to 7 feet, take 23 lb. to each superficial foot; and for a girth of from 7 to 9 feet, reckon 31 lb. to the superficial foot.

4. For small cattle and calves of a girth of from 3 to 5 feet, 16 lb. to the foot; and for sheep, pigs, and all cattle measuring less than 3 feet, 11 lb. to the superficial foot.

5. When the animal is but half fattened, a *deduction* of 14 lb. in every 280 lb., or 1 stone in every 20 stone, should be made; but, if very fat, 1 stone for every 20 should be *added.*

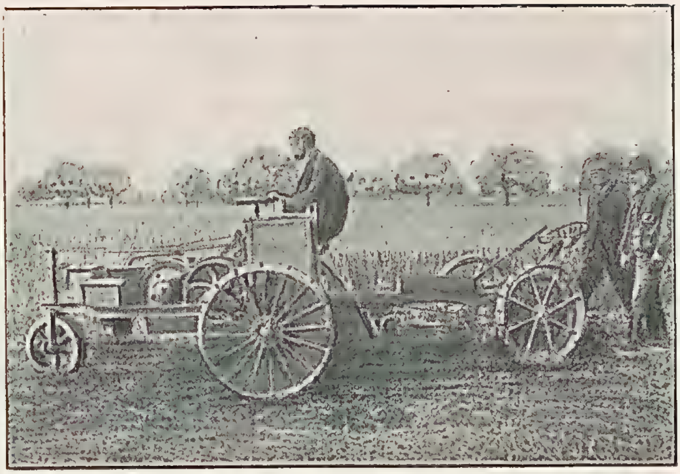
6. Suppose it is desired to ascertain the weight of an animal whose girth is 6 feet 4 inches and length 5 feet 3 inches: 76 inches girth by 63 inches length $= 4{,}788$; $4{,}788 \div 144 = 33{\cdot}25$ superficial feet. Multiply this result by 23, and you will have 764·75 lb. or $54\frac{4}{7}$ stones.

The deduction or addition mentioned in paragraph 5 should then be made, according as to whether the animal may be in ordinary or in very fat condition.

THE IVEL AGRICULTURAL MOTOR.

No doubt one of the features that will distinguish the twentieth from the nineteenth century will be the universal motor. Even a couple of years ago the motor was considered little more than a plaything for the rich, and though the automobile still remains for the greater part in this sphere there is no doubt that it has come to stay, and the process of perfection is only a matter of time. With a higher degree of perfection will come extended use in business, and it is not surprising to know that agriculture is receiving a share of the thought of inventors and improvers. The automobile for marketing purposes is no new idea, and many may have dreamt of the horse as a matter of history in the cultivation of fields, but so far his position seems secure. That the next decade will find matters quite the same is by no means certain, and the latest invention to take his place in ordinary farm work is the Ivel agricultural motor. Anyone but an expert will get a better idea of the motor from the illustration opposite than columns of description would convey. It is driven by petrol, and is constructed to draw mowers, reapers, &c., which are joined to the motor by a spring coupling. It is designed for home work as well, and can be utilised for pulping, root-cutting, grinding, &c. In all this the inventor and maker, Mr. Dan Albone, Ivel Motor Works, Biggleswade, Beds, claims that it comes out in cost considerably less than horse labour. New inventions do not always fulfil the hopes of inventors, and whether this type of motor is designed to banish the horse from farm work remains to be seen. There seems little doubt, however, that so far as reaping and mowing is concerned it is a complete success. A demonstration was given on the farm of Mr. C. Capon, Hill Farm, about 2 miles from Biggleswade, on Wednesday, 23rd August, when, at a gathering of agriculturists, the latter were much impressed with the work of the machine attached to a mower. One of the local farmers offered to buy the machine if Mr. Albone would sell it. It was kept at work for about an hour and a-half, and everything passed off without a hitch. The speed was much greater than horses, being about 6 to 7 miles an hour, but the work was good, and, needless to say, quickly done. Mr. Albone hopes to make the machine suitable for the plough or cultivator, but as it is it would often prove useful even on farms fully stocked with horses. One advantage of machinery is that it does not eat when not working, and evidently at a hurried time a machine like this could do much more in a day than a horsed mower.—*Mark Lane Express.*

Plate XXII.



The Ivel Agricultural Motor.

Plate XXIII.

The Madagascar or Lima Bean.

THE MADAGASCAR BEAN.

This valuable pulse, known also as the Horticultural Lima Bean (*Phaseolus lunatus*, var. *inamœnus*), is well known in this State, and is deserving of much more extensive cultivation than it receives at present, as it is a most valuable vegetable—the seeds, used either in their dried state or green, forming a very palatable and highly nutritious food. The unripe beans are cooked in a similar manner to broad beans, but the dried beans require soaking for twenty-four hours previous to use. They are infinitely superior in flavour to broad beans and are far more prolific. Some people use the young immature pod as French beans, but the unripe seeds are a much better vegetable. The beans are similar in shape and size to the common Lima, but, instead of being white like that variety, they are mottled, brownish-mahogany, dirty white, spotted with brownish-mahogany. If planted in November they will bear in May or June. They should be grown on a strong trellis if a crop of seed is desired. As a green manure crop they also have great value.

Another variety, the *Dolichos Lablab*, var. *purpurens*, sometimes called the Tonga bean, is a very prolific fruiter, but is more adapted for green manuring than for the table. The flower, stems, and pods are of a purplish colour, and the beans are roundish-oval, having a prominent white keel, by which they are attached to the pod, and are of a darkish-brown colour.

Mr. H. C. Quodling, manager of the Hermitage State Farm, has a certain quantity of the Madagascar bean seed for distribution in small quantities. Very few seeds will give a large return. We strongly advise farmers to obtain some of the seed, and once they have discovered the value of the bean as a vegetable they will never be without it. Last year we grew six plants, and these supplied us with large quantities of seed which, boiled green, proved an excellent vegetable. We do not advise treating the young pods as French beans. An advertisement in this number of the *Journal* gives particulars concerning the seed for distribution at the Hermitage.

THE BREAST-PLOUGH.

Mr. George Iles, Woombye, writes:—On opening my *Journal* last night I was deeply interested to see the picture of the man planting his potatoes with the breast-plough; and, on reading the reprint from the *Mark Lane Express*, I was greatly amused. Considerably less than half seventy years ago I can remember the breast-plough being in general use, but not in the manner mentioned in the article. Breast-ploughing and burning were considered the best means of getting the foul, couchy land ready for a crop, by the following method:—In open weather, in the winter, the horse teams "baulk-ploughed" it—that is, took a furrow about 12 inches wide, the share being set to cut 6 or 7 inches, and turning the cut part on top of the "baulk," or uncut part. This done, the field was let to labourers to breast-plough and burn at from 12s. to 15s. per acre, the farmer harrowing and working the turf when turned over by the breast-plough, the man and his family doing the burning and spreading the ashes. Twenty-six or twenty-seven years ago, as a child, I was helping my father at burning. On asking why the horses did not plough all the ground, he said the land would lie too close together, but by baulking it the sod is left open to the frost and wind, as when the breast-plough turns it the furrow is still wrapped together, though broken, and the harrows tear it to pieces. Since I can remember, the broad share was used more than the breast-plough to cut the baulks with the horse team. They were lively times in those days when there was a dry spell in the spring. There would be, perhaps, five or six men and their families,

with forks and burning-rakes, a team or two of oxen on the heavy turf-drags, a four-horse team with lighter drags, then three horse-harrows coupled by riders, a pair of horses chain-harrowing, and another pair rolling, the burners working the turf into wothies (rows), and finally into small heaps, a bunt of straw being tucked into the heap on the windy side and fired. When the ashes were hot and clean, then was the time to put in the bacon and potatoes to cook for dinner. The bacon was wrapped in brown paper and buried in the ashes, as we do with a damper; and, take my word for it, with a piece of home-made bread mother made, and half-a-pint of beer father brewed, there was a dinner fit for a king, and never in any part of the world have I enjoyed a feed so much.

Anyone visiting Chedworth, in the Cotswolds, in March or April, "ater zix o'clock at night," in fine weather, can see the labourers planting their allotments with the breast-plough—potatoes every second furrow, peas in each furrow, with barley sown first and turned in 2 inches or so. When planting is finished, the "hoodden hooman" (wooden woman*) is put away in the tool-house till next spring.

By the way, the breast-plough is *not* pushed *breast-high*, but simply raised in soft ground to enter, exactly the same as a swing-plough. In hard sod land the man takes the beam near the centre, and, with a sharp jab, drives the point the required depth; then, stepping back, throws his weight into the upper part of the thighs, the beaters hanging from his belt.

LIME AS A SOIL IMPROVER.

Mr. W. Brampton, Richmond Hill, writes that he greatly appreciates Mr. Brooks' excellent article on lime as a soil improver in the October issue of this *Journal*. In his own country Mr. Brampton says much of the arable land was a stiff clay often impossible to break up, and which ploughed like a bar of soap from one end of the furrow to the other. The farmers used to spread unslaked lime on the land and plough it in. After some time, the stiff land became as friable as an ash bed. He cannot understand what objection there can be to this method of putting the lime on the soil, for it saves a great deal of work.

[Theoretically, it would seem better to plough under the lime rather than to harrow it in, since the sooner and the more intimately and completely the lime is brought into contact with the soil, the more thorough will its action be. All that is left uncovered until it has changed to carbonate of lime can never act as caustic lime. What is wanted in dealing with lime is rapidity. Once the work is commenced it should be hauled, slaked, spread, and ploughed under as soon as possible. The great merit of laying out quicklime in small heaps on the field and allowing it to slake there is that the powdery product can be distributed on the field with less annoyance to the workmen than if the slaked lime had to be carted.—Ed. *Q.A.J.*]

REPORT ON WORK—QUEENSLAND AGRICULTURAL COLLEGE.

JULY, 1902.

Farm.—During the first week, prepared land and sowed Cape barley on plot 10 (5 acres). The land was ploughed to a depth of 18 inches by means of the road-making plough; the barley was planted at a depth of 3 inches by a seed drill. Ploughed 9 acres to a depth of 15 inches, and planted with lucerne; owing to the dry condition of the soil, the seed, 10 lb. to the acre, was planted 2 inches deep. Seven tons of pumpkins were harvested from plots 9 and 10; 2 tons of cowpea from section 1; and 2 tons of potatoes from a portion of section 4. Ploughed sections 1, 9, and 4 (5 acres each). Hauled stable manure, 36 tons to 1½ acres, section 9. The steam pump, which lifts 3,000

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* It is never used now on the farm.

gallons of water per hour, was kept constantly going for 10 hours daily; the water was utilised on the vegetable garden and also on plots of lucerne and Cape barley. The irrigated lucerne has made rapid growth, and one cutting of 4½ tons has been cut and fed to animals. The morning hour before breakfast has been devoted to clearing and stumping land in what is known as the Gatton Paddock. A great deal of haulage—wood, sawdust, &c.—has been done during the month. Total rainfall for the month has been ·04 inches.

Dairy.—During the month 864 gallons of milk were converted into cheese and butter; 724 gallons gave a return of 325 lb. of cheese, and 140 gallons yielded 159 lb. of cheese. The above was the product of 48 cows which were milked during the period. The animals were fed on mixed chaff (oaten and wheaten), together with 2 pints of molasses to each cow per day. When we discontinued to feed molasses, a 10 per cent. decrease in the flow of milk was noticeable. The chaff was steamed before feeding. The increase in the dairy herd was as follows:—Jerseys, 1 male; Ayrshires, 2 males, 1 female; Shorthorns, 1 male; crossbreds, 1 male.

Pigs.—We are now in possession of a very fine healthy lot, for which a good demand exists. We are in constant receipt of letters from people who have purchased our purebred stock, expressing their satisfaction with the animals that have been sent to them. The increase for the month included 15 Berkshires and 5 Middle Yorkshires. We disposed of, for breeding purposes, 1 Large Yorkshire sow, 2 Middle Yorkshire sows, 3 Berkshire boars, and the same number of sows.

Garden.—A great deal of vegetable seed has been planted, and the plants are making rapid progress. Thanks to the irrigation, which has been freely resorted to, we have had a fine supply of vegetables of every kind. A creditable exhibit of vegetables was sent to Gatton Show, and received very favourable comment. During the month, Mr. Voller, the assistant fruit expert, with the assistance of the students, worked hard to get the pruning finished in reasonable time. Mr. Rainford also visited the College during the month, and made every effort to have the vines in a condition to produce a good crop of grapes.

Mechanical Department.—The principal work during the period under review was fencing, making gates, painting and repairing implements, drays, wagons, &c, shoeing horses.

AUGUST 1902

Farm.—The weather still continues dry, and very little grass is now to be seen in the district, I find that sorghum and *Paspalum* grass still continue to grow, but very slowly. The principal work done during the month was as follows:—Breaking up newly-cleared land in the Gatton Paddock (30 acres). Five acres of pumpkins (three varieties) were planted in section 5. Cut into chaff 3 tons of *Paspalum dilitatum* grass, which had been converted into hay some months ago, for the purpose of testing its value as a fodder in this form. The hay contained a large amount of moisture and was much relished by animals, which ate it in preference to other food, such as oaten hay chaff mixed with bran and molasses. I consider that this grass, if well saved, will make a good hay. A good deal of time was given to the preparation of exhibits for the Brisbane Exhibition. This work was partially left in the hands of Students Thynne, Stumm, Chataway, Walker, and Thorn, and I think it must be admitted that the exhibit reflected great credit upon these lads who worked hard to make the show a success. The usual irrigation of garden, barley, and lucerne plots had our best attention. Some time also was devoted to placing and erecting a new centrifugal pump on the Lockyer Creek. The total rainfall for the month has been ·66 inches.

Dairy.—The average number of cows milked during the month was 54. These were fed on steamed oaten chaff and molasses. Nine hundred and forty gallons of milk were treated, producing 393 lb. of butter, and 240 gallons were supplied to the dining-hall. The increase in the dairy herd included—Ayrshires, 2 males, 1 female; crossbreds, 3 males.

Pigs.—The increase for the month comprised—Berkshires, 13 boars, 8 sows; Middle Yorkshires, 6 boars, 6 sows. We sold 2 Middle Yorkshire boars, 1 sow, 2 Berkshire boars, 3 sows, all for breeding purposes.

Garden and Orchard.—This department is now the show one at the College, and reflects great credit upon Mr. Jackson, under whose supervision the work is carried out. We have been supplying the greater part of the Lockyer district with vegetables, in addition to the large quantity required for our own use. A great deal of labour has been given to destroying the aphis, which has been most troublesome this season. Irrigation has been in full swing, and the cultivation has been kept well in hand. The pruning of fruit trees has been finished, and the trees are now sprayed with a mixture of resin and soda. The vines have been pruned and treated with a solution of water and sulphuric acid. At this season of the year a great deal of knowledge in connection with garden, vineyard, and orchard, is imparted to the students who take part in the practical work.

SEPTEMBER, 1902.

Farm.—The weather still continues dry, with the exception of a few storms that have taken place, but the amount of rain which fell was only sufficient to cause a spring in the grass. These storms also brought about germination in seeds which were planted some months ago, and in this connection will, unless we get rain within the next few weeks, do more harm than good. We began irrigating the lucerne in the farm paddock. Work was commenced each day at 5 o'clock a.m., and continued until 6 p.m., meaning 13 hours, or 12 actual working hours per day, 1 hour being allowed for stoppages; 15,200 gallons per hour were pumped, and the water applied to 2½ acres per day, equal to about 3 inches of rain per acre. The lucerne is making rapid growth; the first cutting will be made about the middle of next month. A great deal of the newly-cleared land in the Gatton Paddock was broken up. Ten acres of maize were planted in plots 1 and 4—four varieties. An additional 10 acres were prepared for planting maize. The spring-tooth harrow was used on lucerne land prior to irrigating. Seventy chains of drain were made in cultivation land along the Tarampa road. Split and prepared fencing material for erection around newly-cleared land in Gatton Paddock. A great deal of haulage—wood, sawdust, prickly-pear, chaff, &c.—was done during the month. The rainfall for the month was ·73 inches.

Dairy.—During the period under review, 1,088 gallons of milk were converted into butter for a yield of 454 lb., and 248 gallons were supplied to the dining-hall. The average daily number of cows milked was 55 head. The animals were grazed on the lucerne plots, and fed twice daily on steamed oaten chaff, 22 lb. to each feed. Experiments are being made with prickly-pear feeding; the pears are being procured near Laidley township, and hauled to the College, a distance of 8 miles. The increase for the month was:—2 Shorthorns, 1 male, 1 female; Jerseys, 1 female; Ayrshires, 1 female. The young calves were fed on separated milk with a little pollard mixed with it, and green lucerne.

Pigs.—These animals have been fed on green barley and lucerne; the breeding sows with kitchen swill and a little pollard. The increase of pigs for the month was as follows:—Berkshires, 21 head; Middle Yorkshires, 12 head.

Garden and Orchard.—The orchards and vineyards have been thoroughly cultivated, and all cuttings removed and burnt. The vegetable garden has been kept irrigated, and, where necessary, all the available land has been ploughed and prepared, and is now ready for seeding. The following have been planted during the month:—Pumpkins, marrows, squashes, cucumbers, rock melons, lettuce, cabbage, tomatoes, egg plants, leeks, onions, beans, beets, carrots, and radishes.

Mechanical Department.—Mr. Quinn, late mechanical master at the College, has been appointed lecturer and demonstrator in the mechanical branch at the College. It is needless to say that this appointment is an acquisition to the staff, because Mr. Quinn's services have always been much sought after, and highly appreciated here. All the buildings that have been erected by the College were built under his supervision. A good deal of the time of the blacksmith and carpenter was occupied in assisting at the erection of the new centrifugal pump on the Lockyer Creek. Ploughs were overhauled and repaired; wagons, drays, and weighbridge were put in good order. The remains of the chaffcutter, which suffered through fire at the hayshed, were cleaned and got ready for rebuilding. Gates were made and hung, fences erected and repaired. Steps leading to the platform at the College Railway Station were put in.

QUEENSLAND CHAMBER OF AGRICULTURE.

By the courtesy of the Hon. the Secretary for Agriculture, we are permitted to publish the following notes of the business transacted by the Chamber of Agriculture during the past month. The secretary, Mr. F. W. Peek, writes:—

In forwarding the attached brief notes of the business transacted during the past month, I am directed to thank the Hon. the Minister for Agriculture for his kindness in acceding to the request of this chamber's affiliated societies in allowing a few brief notes to be published in the *Journal.* I am also desired to acknowledge the help and assistance rendered the chamber by the officers and staff of experts attached to the Department of Agriculture for their kindness at all times, in being ready to advise on all matters brought before their notice, and to express the hope that the good work now being undertaken by this chamber may get the moral and practical sympathy and support urgently necessary to the future well-being of one and all interested in the agricultural and pastoral progress of Queensland.

During the past month several matters of interest have been brought forward and discussed, some of the more important being:—

The appointment of a deputation to wait upon the Minister for Agriculture and Education in reference to agricultural education in State schools; the Minister, after hearing the views explained, stated his sympathy with the objects desired, and has caused a circular to be issued to the various inspectors of Education Department to report as to what appreciable advantages have accrued from such instruction given in the past.

The question of compiling a certified list of judges for the various branches of the agricultural industry having been raised by various affiliated societies, the chamber passed the matter on to the National Agricultural and Industrial Association, asking them to take the necessary steps to give it effect. This has been done, and a circular letter is now being forwarded, asking the various societies to get the names of individuals specially qualified to act as judges and forward them in.

A deputation also waited upon the Minister for Agriculture, at the request of the Drayton and Toowoomba Agricultural and Horticultural Society, to endeavour to have an amount placed upon the Estimates to defray the cost of railway fares of judges attending shows in an official capacity; also, a request was made by the chamber for reduced railway fares for members attending conferences, meetings, or as delegates for agricultural societies.

The Minister, whilst agreeing with the objects aimed at, placed the serious question of finance before the deputation, and pointed out that this question involved more than his department, as it was a matter also for the Minister for Railways to consider. Anyway, he (the Minister) promised to consult with his colleagues and to see what could be done.

In reply as to the sum desired to be voted as expenses for judges, the deputation suggested the sum of £100 as a first amount, and to await results.

Several letters of importance were read from the Chambers of Agriculture in Victoria, New South Wales, South Australia, and the Chamber of Commerce of Tasmania, all in sympathy with the action taken here on various matters, especially in the direction of establishing a Federal Chamber of Agriculture, and suggesting an early conference to discuss matters of interstate importance to agriculturists.

Five new members and one society joined during the month—viz., the Central Downs Agricultural and Horticultural Society. This makes a total of sixteen societies and 121 private members or individual subscribers. A large number of publications have been received, including several measures forwarded by the Queensland representatives in the Federal Parliament.

The Acting Commissioner for Railways has still under his consideration the question of the periodical inspection of weights and weighbridges with the issue of certificates of correct weights.

A reply has been urgently requested in time for the next meeting of the chamber as to the action that will be taken.

The reports received from the Roma, Allora, and other representatives still point to no change climatically, and urge upon the chamber the serious position of the pastoralists and wheat-growers; also, the urgent necessity for action to be taken in evolving the problem of water conservation and cheap systems of irrigation. This matter is now under the consideration of the chamber, who would be pleased to receive any suggestions from practical men upon this question as to any results already undertaken in this State of value to the small farmer, the system adopted, and the cost, outlay, &c.

The question of markets was also considered, and a deputation was appointed to wait upon the authorities concerned at an early date.

A paper was promised by R. M. Collins, Esq., of Tamrookum, to be read at a special meeting this month, entitled "Pastoral Interests," with a special reference to the holdings and tenure.

BANANA RUBBER.

The *Tropical Agriculturist*, Ceylon, quoting from the *Indiarubber and Trades Journal*, says:—Substitutes for indiarubber appear to be getting more and more numerous. The latest idea is certainly the best! As recorded in the pages of the *Fruit Grower*, the information must be of great value to its readers as well as to the manufacturing trade. The writer introduces his subject as follows:—There have been for many years past attempts to provide a substitute for rubber, the market price of which has in the past decade gone up by leaps and bounds. There is even talk at times of the supplies giving out. According to a report recently received in this country, a method had been patented for perfecting the manufacture of an artificial indiarubber from banana fruit skins, and a company is to be formed to work the process. Small cuttings of sheet rubber made up of a percentage of "banana rubber" and Para rubber have been exhibited in this country, and it is said to be difficult to tell the difference between this combination and pure rubber. It is claimed that banana rubber can be made at about half the price of pure Para rubber. When the skins of the banana (used according to this process) are *proved* to be worth more than the fruit itself, an enormous impetus will, of course, be given to the transport of bananas from West Africa and other parts of the world, where this fruit is so prolific. It is said that Messrs. Rowntree and Company, of York, who own large estates in the West Indies, are making exhaustive experiments in the manufacture of banana rubber.

Dairying.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 30TH JUNE, 1902.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Amy ...	Ayrshire	7 Nov., 1901	207	3·8	8·80	Dry, 30-6-02
Jeannie ...	,, ...	7 Oct. ,,	340	3·3	12·5	With first calf
Lena ..	,, ...	3 Dec. ,,	420	3·7	17·4	
Lowla ...	,, ...	3 Dec. ,,	144	3·8	6·12	Dry, 28-6-02
Rosebud ...	,, ...	13 Nov. ,,	424	3·8	18·04	
Ruth ...	,, ...	12 Dec. ,,	202	3·6	8·14	Dry, 30-6-02
ReamRouthie	,, ...	13 Dec. ,,	371	4·0	16·62	
Leesome ...	,, ...	15 Jan., 1902	446	4·1	20·4	
Lonesome ...	,, ...	22 Jan. ,,	128	4·2	6·02	Dry, 27-6-02
Renown ...	,, ...	22 April ,,	501	3·4	19·07	
Blink ...	,, ...	28 April ,,	527	3·6	21·24	
Bonny ...	,, ...	15 May ,,	384	3·4	14·62	
Realm ...	,, ...	17 May ,,	323	3·8	13·74	
Molly ...	Grade Ayrshire...	5 Oct., 1901	84	4·0	3·76	Dry, 14-6-02
Effie ...	Jersey	18 Nov. ,,	112	5·0	6·27	Dry, 18-6-02
Jersey Belle	,, ...	17 Jan., 1902	335	4·4	16·50	
Stumpy ...	,, ...	17 Mar. ,,	467	4·6	24·05	
Frizzy ...	Shorthorn ...	29 Nov., 1901	402	3·8	17·10	
Lady Vixen	,, ...	13 July ,,	93	4·2	4·37	Dry, 16-6-02
Kit ...	,, ...	14 Jan., 1902	452	4·0	20·02	
Louisa ...	,, ...	23 Dec., 1901	389	4·0	17·42	
Violet ...	,, ...	20 Jan., 1902	452	3·4	17.21	
Curly ...	,, ...	12 Nov., 1901	187	4·0	8·48	Dry, 28-6-02
Esma ...	Grade Shorthorn	29 Nov. ,,	74	3·9	3·23	Dry, 10-6-02
Dora ...	,, ,, ...	18 May, 1902	328	3·3	12·12	
Restless ...	,, ,, ...	16 Mar. ,,	456	3·4	17·36	
Peggie ...	,, ,, ...	19 April ,,	421	3·7	17·44	
Stranger ...	,, ,, ...	6 Nov., 1901	123	4·2	5·78	Dry, 28-6-02
Alice ...	,, ,, ...	18 Jan., 1902	333	3·6	13·42	
Poly Red ...	,, ,, ...	3 Jan. ,,	155	3·8	6·59	Dry, 30-6-02
Rosella ...	,, ,, ...	18 Jan. ,,	417	3·5	16·34	
Rowly ...	,, ,, ...	22 April ,,	425	3·6	17·13	With first calf
Lilly ...	,, ,, ...	22 Feb. ,,	396	4·2	18·62	With first calf
Catch ...	,, ,, ...	13 Feb. ,,	327	3·8	13·9	With first calf
Haze ...	,, ,, ...	11 Feb. ,,	338	3·4	12·87	With first calf
Princess ...	,, ,, ...	5 June ,,	358	4·1	16·43	With first calf
Winnie ..	,, ,, ...	17 June ,,	110	3·0	3·69	With first calf
Reannie ...	Holstein Sh'rth'rn	7 Mar. ,,	520	4·0	23·29	With first calf
Mona ...	,, ,, ...	3 June ,,	454	4·0	20·33	With first calf
Angel ...	Holstein Devon...	5 Dec., 1901	309	3·8	13·15	With first calf
Damsel ...	Holstein	16 Jan., 1902	537	3·4	20·44	
Topsy ...	South Coast ...	4 Oct., 1901	327	3·4	12·45	
Fancy ...	,, ,, ...	19 Jan., 1902	431	3·6	17·37	
Lady Rose ...	Guernsey ...	26 Feb. ,,	326	5·0	18·20	
Plover ...	Shorthorn ...	7 Feb. ,,	372	3·6	14·99	
Guinea ...	,, ...	9 June ,,	345	3·2	12·36	
May ...	,, ...	26 June ,,	45	3·5	1·76	
Sweet ...	Jersey	6 June ,,	381	3·9	16·63	With first calf
Lemon ...	,, ...	18 June ,,	150	4·0	6·72	With first calf
Double ...	Grade Jersey ...	9 June ,,	284	3·5	10·13	With first calf

The herd was fed night and morning on steamed wheaten chaff and molasses.

THE RADIATOR—A PROMISED REVOLUTION IN THE DAIRY WORLD.

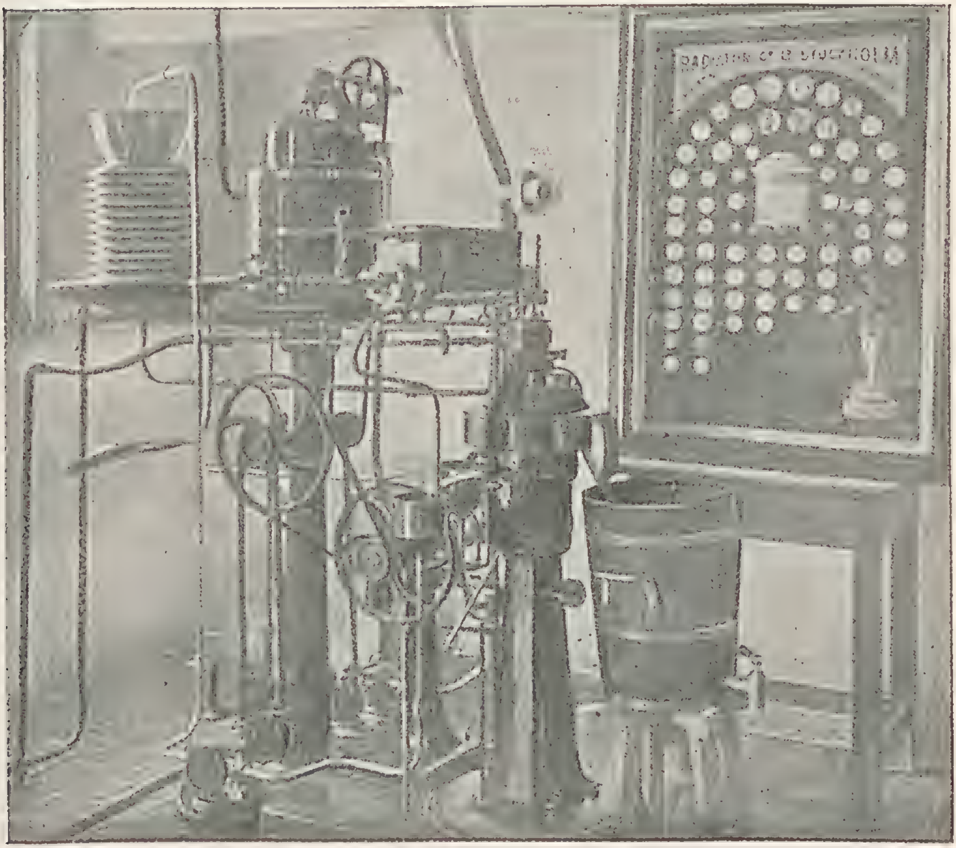
The invention of the centrifugal cream separator made modern dairying possible, and it looked as if any further advance of a revolutionary character was out of the question, but the apparently impossible has happened. During the past month we (*Australian Agriculturist*) were invited to witness the trial of a new machine of Swedish invention at the premises of the Fresh Food and Ice Company, and found Mr. Andersson, Dr. Lebrun, Mr. Helstrom, the Acting Consul for Sweden, and a number of dairymen and factory managers present. Two machines had been erected—one capable of dealing with 55 gallons of milk an hour, and one with 180 gallons. The smaller machine was used for the trial.

Though we have called the appliance a machine, it is little short of a butter factory, for one end of it receives milk and the other gives out butter, the only method we believe by which butter can be made from the milk direct. The illustration shows the general appearance of the machine, and will help the reader to follow the course of the milk in its passage through it from the milk tank at the rear to the butter on the worker.

The milk tank having been filled and the machine started, a small rotary pump drives the milk to the pasteuriser at the top, and here it is subject to the heat necessary for sterilising it. About fifteen minutes were required in starting before the first milk had passed through the pasteuriser, but the circuit once established the flow is continuous. The second stage is the passage of the now hot, but sterile, milk to the cooler immediately over the separator; this cooler is of a new and very rapid type, and quickly reduces the temperature to separating point, and here we may say that the radiator claims to work with milk at a higher temperature than is possible with any other system, ordinarily milk must be reduced to 48 to 52 degrees before satisfactory work can be done, whereas the radiator will do good work with the milk at 65 to 70 degrees—a matter of great importance in country districts, where really cold water is as scarce as ice itself. From the cooler then the milk descends into the radiator; and here we should note that if cream only is desired, a turn of a handle shuts off the butter-maker, and cream is delivered; but our interest now is butter, and we are shown the novel method by which this is made. From the second machine Mr. Andersson shows us the appliance, which is the most marvellous part of the whole invention, and which we hardly know how to describe. It is, however, a tube a few inches only in length, but varying according to the size of the machine and its capacity. This tube is perforated with fine holes, and, as the end of the tube is curved, it dips below the revolving body of cream into a lower stratum of separated milk, which is driven into it, and ascending in the tube passes with considerable force through the perforations, and impinging upon the cream causes it to granulate. This simple, but effective, butter-maker is the crux of the whole thing. It cannot be called a churn, and is a puzzle to the practical buttermen standing round, one of whom remarks: "I don't know *how* it does it, but it *does*"; and about that there is no room for doubt, for the butter begins to come from the shoot, as the wooden collectors—like miniature spades—come round in turn, each one with its load, delivering it into the butter-tub. There is, of course, the butter-milk present with it; and the first thought is that the making has not been thoroughly done—that the butter-fat has not sufficiently granulated, since it looks like thick rich clotted cream; this idea is soon disproved, however.

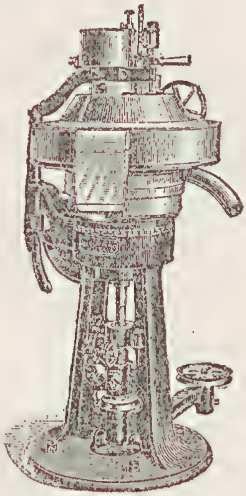
The milk vat is now exhausted, but a quantity of separated milk is put in to supply the pump until the whole milk has passed through the butter-maker. Whilst all this has been going on the separated milk passing from the radiator, after parting with the cream, is lifted by a second pump to a disc cooler at the back, and is then discharged cold into the cans, in which it may be conveyed to the calves, or the piggery, or elsewhere.

Plate XXIV.



The Radiator.

From the butter-tub the butter-milk is now drawn off, and the butter itself washed and removed to the worker. It is, of course, absolutely pure and absolutely fresh; it has never been exposed to the air a moment from the time when in the pasteuriser any possible disease germs or bacilli were destroyed until it came to sight as butter. We now can see it on the table of the worker, and there is no doubt about the complete granulation. It has a rich colour, for by a neat little attachment the butter colour is added during the process of manufacture, the drops being perfectly regulated to suit the colour requirement of any market, and the colour is completely incorporated with the texture of the butter, and it will be seen that when the colour requirement of any market is known it can always be maintained uniformly.



Separator and Butter Maker, for Farms.

It will thus be seen that, as we have said, the machine is a butter factory, nothing but the worker being required to complete the process from the milk can to the butter case; but, on the other hand, the radiator can be had as separator and butter-maker alone, the pasteuriser, coolers, &c., being additions.

The question now arises, how far will radiator butter meet the public taste, and how will it keep? As to the first, there is no doubt that the popular taste in this, as in many other things, is an acquired one—coffee, for example, is adulterated with chicory, but many people have grown to prefer the mixture, and thus absolutely pure and fresh butter may not meet the public taste; in that case, the flavour acquired by the lactic ferment can be added, we are told, and this can also be done for butter which is required to keep for long periods. Mr. Andersson claims that radiator fresh butter will keep longer than any other fresh, whilst ripened it will keep longer than any other ripened. We are told that a case of Swedish butter, shipped to Melbourne, was again shipped to London, thus crossing the tropics twice, and that it realised top price in London as best Victorian butter. Orders from New Zealand for close on £30,000 for machinery are said to have gone, and about fifty more machines are now ordered for that State, whilst it is claimed that almost all the high-class Danish butter reaching the London market is radiator made. The illustration on this page represents the machine as a separator and butter-maker, adapted to small farms; a separator only can be had, to which the butter-maker can be added at any time afterwards. The larger one shows the same machine of a larger size, with pasteuriser and coolers, &c., complete.

Poultry.

TURKEYS, GEESE, AND POULTRY.

No. 1.

Rearing Turkeys.

Where the owner has a good run for his birds, turkeys are as easily raised, and as hardy as, indeed hardier than, any other denizen of the poultry-yard. The young chicks require a considerable amount of care and attention until they are about three months old. After that they are, regardless of rain or storm, roosting out in the open, with perfect immunity from disease. Hence they are, without doubt, the most profitable class of domestic poultry. It should, however, be noted that dry soil is an important requisite for successful turkey-raising. Where there is only a cold, damp soil, it is mere waste of money to attempt to rear these birds.

Given suitable land and a wide range, the intending breeder should begin with half-a-dozen good hen turkeys and the best cock bird obtainable. As soon as enough eggs have been obtained, start setting them, so that you can test the eggs early to see that they are fertile. Set the eggs in boxes with no bottoms somewhere out in the field. All the cover the sitting hen requires is shelter from the hot sun, heavy rain, or cold westerly winds.

As soon as the young birds are hatched, shut them up in coops for a day or two to let them get used to the hen's voice. A good plan is to put them in a pen enclosed by boards about 18 inches high. As soon as they can fly over the boards, you may let them all go free. They need never be shut up again, no matter how bad the weather is. For the first week, feed the young turks every two hours on chopped, hard-boiled eggs, or custard also chopped up very fine, and mix with this some fine biscuit-meal. For the next few weeks, feed them five times a day with eggs and medium biscuit-meal, and give them in the second week some finely chopped green stuff—nettles for preference, if you have them. In good seasons nettles are plentiful in many parts of Queensland. Mix this with some grit amongst the other food. When the birds are four weeks old, mix with the same food some home-ground meal, composed of two-fifths oats and one-fifth each maize, wheat, and barley. You may now also start a little meat diet, such as finely chopped liver, greaves, &c. This meat must be well cooked and mixed with the other food. Give a last meal about 5 or 6 o'clock of oats or wheat. This diet must be supplied four times a day until the red colour and excrescences appear on the neck, when you may use more ground meal, less biscuit-meal, and no eggs. After maize, wheat, or barley have been harvested, the birds will practically keep themselves in the fields.

When they are three months old is the time to look out for diarrhœa and indigestion. These troubles will reach them if they are allowed access too early to growing oats and corn in the milk stage. They should never get anything but old grain. The best remedy for indigestion, which trouble you can at once detect by their lagging behind the rest, and by the unnatural colour of the head, is to give a half-teaspoonful of castor oil and keep them away from the rest of the flock till their appetite returns. After this stage of indigestion is passed, all there is to do is to feed plenty of cracked corn. For roosts, let the poles be broad. This will prevent the deformity of crooked breast.

The best all-round turkey is the Bronze, especially for size and stamina. The largest turkeys fetch the highest price. Turkeys do not arrive at full maturity till they are three years old. Therefore, see that your stock birds are two years old or more; otherwise the chickens will be delicate and difficult to rear.

FEEDING POULTRY.

Change of diet now and then is very beneficial to poultry. For the most part, fowls receive very little variety of food; day after day and week after week the same allowances of the same kind of provender are given. In time the appetites of the birds get a bit jaded, and in consequence there is a diminution of the egg yield. Sticking to one or two kinds of food only also deprives the birds of certain alimentary elements which they require, for most foods, while rich in one particular element, are often deficient in others which are quite as necessary for the wellbeing of the birds. It is never wise, for instance, to feed on barley-meal in the morning and barley, as hard grain, in the evening. The two meals of the day should be essentially different. Barley-meal in the morning might go with heavy oats in the evening, or ground oats in the morning with wheat in the evening, and so on; but it does not do to make changes every day or two—keep to one line of feeding for three weeks or so, and the birds will thrive all the better. And if they have an unlimited grass run, do not be afraid to give an occasional feed of maize. Under such conditions they will relish it, and it will do them good. A good biscuit-meal, if it can be got cheap, forms a capital change for the morning meal.

After chickens are a few weeks old, a feed of groats in the evening is very beneficial. They are very nourishing and easily digested, being free of the outside husk. Those who have not hitherto used them in chicken-rearing should give them a fair test this season, and prove their value for themselves.

CANNING AND CRYSTALLISING PINEAPPLES AND CUMQUATS.

The canning of pineapples is practically the same as that of any other fruit. Peel, slice, or cut into dice, pack in cans, and add syrup. The density of the syrup depends on your trade, and will average about 4 lb. sugar to 1 gallon rain water. Cook from 15 to 20 minutes. To put up cumquats in heavy syrup, first boil in fresh water until the fruit is soft, but still firm enough to keep its shape. Throw away the water, which is very bitter. Put the fruit in a heavy syrup, and boil till ready, but slowly, so as not to break the fruit, as it should be whole.

To Crystallise.—In the case of pineapples and cumquats: First bleach the fruit by placing it in boiling water. Next put it into a low strength syrup, and heat to boiling point. Let it remain in this syrup for 24 hours. Then increase the density of the syrup by 10 per cent., and again heat to boiling point, leaving it as before for 24 hours. Increase the density of the syrup daily by 10 per cent., always bringing the fruit to the boiling point till it is strong enough to crystallise in cooling. When in this state, the fruit is taken out and dried slowly in iron trays. Pack in air-tight tins. Tins are the best for this climate. The crystallising of cumquats and pineapples is very similar to the crystallising of lemon and citron-peel. In bleaching the fruit, care must be taken not to allow it to become too soft. In fact, the bleaching is the most difficult part of the work.

The Orchard.

THE CENTRAL DISTRICT.

By S. C. VOLLER.

Under the heading of "Producing Interests," and in connection with the question of the practicability of irrigation in Queensland, the *Brisbane Courier*, of 12th July, had an interesting article by "Koradji."

The part most interesting to me was that referring to irrigation in Central Queensland, and reporting a conversation with Mr. W. H. Campbell, of Barcaldine. I was glad to read this, because there is a lot of important truth wrapped up in it, and because behind it are possibilities that many folks in this country do not dream of.

Mr. Campbell has done well to once more direct public attention to the Central district and its capabilities. Since that date further articles have appeared in the *Courier* and *Queenslander* making reference to the development of this work on several places visited by their contributor.

Three years ago the writer of this article had the pleasant duty of working in the Barcaldine district in connection with fruit culture and general agriculture, and in the *Journal* for November, 1899, in an article intitled "Notes on Rockhampton and Central District," I gave some of the impressions gained during that visit. Reference was then made to the Alice River Settlement, Mr. Campbell's place, Mr. Cronin's, and Mr. Hannay's, on all of which I found much to interest me very keenly, and much which convinced me then of the great potentialities of the district.

I trust I may be pardoned for trying to stir up still further an intelligent interest in this part of our State, for I have been all along sure that great things can, and some day will, be done there.

We are all tolerably familiar with the old saying, "Settle the people on the land," and, though most of our country is under the hard grip of a merciless drought at present, and many folk may be inclined to shrug their shoulders and express the opinion that the land is the last place *they* would think of, I still hold the idea most firmly that it is the best thing that can be done for both people and land.

We want population! We want population that will produce! We want people to come and take hold of the resources and capabilities of this State, and turn them to effect.

We have frequently heard of the boundless resources of our country, and more now than ever has it become recognised that our primary industries must be developed. This is true, because here lies the very source of wealth.

"But," some may say, "would you take people out into that drought-striken desert, and tell them to go ahead, with the idea of making a living and a home?" Yes, I would; and I would expect to see highly satisfactory results, too.

Let us glance back a moment at my "Notes" of 1899, and look at the country out that way as I saw it then. This is what I wrote then: "Now for Barcaldine—reached by a long run in the train through desert country, with its reddish sand, stunted-looking gidya scrub, and spinifex and turkey-bush, presenting an appearance to the eye of the uninitiated and inexperienced traveller just about calculated to produce a fit of the 'blues.' A curious, dry-looking, thirsty, merciless sort of country to some folks, but to a man who knows a few things very apt to start him thinking, and wishing to try a thing or two. I don't profess to be a very wise individual, but I got thinking and speculating in my own mind as we went along through it, and I came to certain conclusions, which I had a good opportunity to test later on, very much to my satisfaction."

There is a big area of this country, thousands and thousands of acres—miles and miles of it—presenting in the main a great scene of drought and desolation that would be very hard to beat anywhere, and yet some day this same country will carry one of the happiest and wealthiest sections of our Queensland population! And why? Because, first of all, it is some of the best land we possess; and secondly, it has the best artesian water in the State under it; put the two together and the problem is solved.

Then the question arises after you get the soil and water together what are the possibilities in the way of production; what can be grown? Well, I would like to ask, *What can't be grown?*—for the possibilities are enormous. And right here is where I am most directly interested in this matter, being one of the "fruit men" of this Department.

In my article referred to I mentioned a long list of vegetables which I saw growing and in use, and my evidence in that direction is most amply confirmed by the fact that for a good while this season the Alice River Settlement has been sending big supplies down to Rockhampton and making good money out of it.

Again, only the other day, the *Courier* had a paragraph referring to the transformation that is taking place at Roma, where people are growing vegetables and green feed, and can laugh at the drought. Now, as to production in the Central district, the land referred to above is, with the exception of odd holdings such as those mentioned, doing practically nothing; but with the aid of the water it will give a long list of valuable products, make money and comfort for the settler, and bring in revenue to the State, which, I take it, is what is wanted. With water made certain, big areas would not be needed, for more intense culture would obtain and make acres produce what miles cannot at present.

Before speaking of fruit work, which is my object, I may, in passing, refer to the fact that, with settlement started, people would get a great deal of what they required to live on from the land, and in many cases have a good surplus for sale.

For instance, in the cooler half of the year, vegetables of many kinds could be grown far in excess of home requirements, and there is a good market for them in more than one direction.

Next, every settler would be able to keep his little herd of milkers in the best of working condition, with an ample supply of food.

Pigs would follow these, and, in addition, certain farm crops could be grown up to fine quality.

I have a very clear recollection of the fine crop of oaten hay Mr. Cronin was growing when I was there; and also of the beautiful appearance of Mr. Hannay's growing wheat, the growth of which was regulated by the help of the bore water, without any need for depending on rainfall.

I remember eating potatoes taken out of the ground eight weeks from planting, and I remember that some of the same crop, dug later, took second prize in their class at Rockhampton Horticultural Show in the spring.

And then to see the way couch grass thrives! When one drives through the outside country, with its bare surface and starvation, and strikes a patch such as I saw at Mr. Cronin's, one wants to rub one's eyes to see if one is really awake, or only dreaming! It is like getting into a new world. I would very much like to see some of these gentlemen on this country make a careful experiment in subdivision of paddocks on a small scale—say 25 acres or so to the paddock—and feed off in rotation in such a way that each paddock would get more spelling than feeding.

I am sure the results would be extraordinary. The settler would then probably be surprised to find how many stock he can carry to a given area.

Sheep as well as milkers should have a prominent place on the farms out there, even under pretty close settlement, and they will pay as they have

never paid before. Crops that may not reach a certain price at times can always be turned into wool and mutton, and not a weed need be lost on stubble land, while the benefit of the manure is gained. Then comes the question of fruit culture, and to my mind a pretty big thing opens up here.

No doubt quite a number of fruits could be grown for domestic use, and would all help to increase the comfort of home life, but there are a few which could undoubtedly be grown very extensively on commercial lines, with the certainty of very satisfactory returns.

First of these come lemons. In my "Notes" of 1899, I spoke in no undecided way of the chances for lemon culture in this district, and what I said then I now repeat, that the best lemons I have ever seen anywhere for all-round quality, I saw at Barcaldine. I told the people then what I thought could be done, and urged them to take the matter up. What has been done I do not know, for I have not had a chance to visit the district since. But the matter strikes me in this way: We import from the South and from the Mediterranean every year an enormous quantity of lemons, and I have seen Messinas fetching up to £1 4s. for cases of 300, which is equal to about 11s. or 12s. per case, as we pack them. This is a high price, of course, and we may allow something off that before reaching a fair average, but even then we would have a substantial figure to work on.

We go on paying this money to other people for goods we can and ought to produce ourselves. We ought to do more. We ought to stop the import and start exporting our fruit to someone else.

I cannot get a clear idea of how many lemons we import, because in records of imports they are mixed up with various other fruits; but the quantity is very large, and will increase unless we produce our own. Now, may we not reasonably ask how long this kind of thing is to go on? A decent lemon orchard properly worked, is one of the best paying things a man can have, and there should be no difficulty in growing big quantities of the fruit, and curing it in such a way as to be able to hold it for a time, until markets are satisfactory, should this be desirable, or to ship away to almost any distance. I may mention here that we are now buying regular supplies of lemons from Mildura; fruit grown on the cypress pine and mallee sandy country, and the quality of this fruit is a strong proof of what can be done.

We have already tested the Canadian market in a small way, but with good results with our oranges. Why not supply Canada with lemons also? I am sure there is good money in this business, if it is only laid hold of properly. Why send out of the State for large quantities of stuff we can produce as well, perhaps, as anyone in the world?

I might mention such things as candied-peel and lemon syrup, which could also be added to the list of products, and we want these things, and are using them every day.

Next come oranges. They can be grown, like the lemons, in almost any quantity, and will pay. Not only is there a good though scattered market all along our railways in the inland towns, and which is supplied very largely at present from the South, but there is the export trade to go for. We can send South early in the season, and we are only waiting for the quantity to go for the Canadian market, and that alone is a big one.

With organisation and proper control of all possible markets by the growers themselves, the output can be enormously increased, even in the State, for it is a lamentable thing, but a fact, that in many of our towns fruit of decent quality can hardly be obtained at all. It ought to be all over the place, available at prices that will suit both grower and consumer, and with proper management this can be done. Oranges pay, and pay handsomely, and out in this country you have a soil that will suit them well, and any amount of it. Why not grow them? Now, a word about olives. With the exception of a few trees here and there, they are not grown in the State. No one has, so far, gone in for them commercially, but the time has come, I think, to make a decided start at it, and this country is the very place for them.

Many people may question the advisability of going in for this fruit, but I may be allowed to point out that here, again, we are paying away money to other people and other countries for what we can grow ourselves.

Every drop of olive oil, and a good deal that isn't olive oil, that we use, is imported. (By-the-way, while speaking of oils, *all the oils we use for any purpose*, excepting say a limited quantity of neatsfoot and shark oil, are imported!)

Every bottle of pickled olives on our tables or in our stores is imported.

We use a fair amount of olive oil, but we ought to use a great deal more of it. It can be used in many ways and for a variety of purposes, and its value is enormous in relation to dieting and health. We use a few pickled olives, while, as a matter of fact, they ought to be on everyone's table and in daily use. Their value is enormous also, besides which they are a delicious addition to one's bill of fare. Ordinarily, we see only the green pickled olive sold here, but let folks get a taste of ripe pickled olives, and they will want more and yet more.

I believe I am safe in saying that nowhere in the world will olives do better than they are doing at our State farms on the Downs.

Not only do they grow better than in most other places, but they come into bearing much sooner, and how they do bear! The crop at the State farms this year was quite sufficient proof for anyone of what they can do.

In America the value of the olive is fully recognised, and in California orchards of large area, even up to 1,200 and 1,400 acres, have been planted, and the business of both oil-extracting and olive-pickling is being pushed for all it is worth, and it is worth a good deal. The American growers are going for the world's trade in addition to their own requirements, and I suppose any day we may expect to find their products in this line as in others in our Queensland stores.

We have ample room, cheap land; can grow the olive better than they can in California; and, more than this, we want industries of this kind. Why not go for this?

The peach is another fruit that could and should be grown in this country I am writing of, and for commercial purposes.

Fresh peaches of a high type and quality are unknown in a great part of Queensland—that is, for table use. Dried and canned peaches, which form a considerable part of our imports of preserved fruits, are extensively used, and are purchased with money which goes right out of the State.

They come from the South and from America, and we do all we can to support the growers in these places and build up their industries for them. Why not support ourselves, and build up our own industries instead?

Here in this Central district we have the land, the water, and the climate that will grow a good peach to further orders. Much of the fruit could be packed fresh and sold for immediate use in towns all along the Western lines. Rockhampton and other coastal towns would use a lot, and drying and canning could be followed up to any extent. Surely there is something here worthy of careful attention!

Another fruit we import a great deal of, and yet do not use in sufficient quantities, and which is one of the most delicious on earth, is the fig. On this desert country we have almost ideal conditions for fig-growing, and there is no reason that I know of why they should not be grown in large quantities. The bulk of the product would have to be dried and packed, as figs in the fresh state cannot be sent any distance. But there is a big line of work open here, and it deserves every possible attention.

What is more enjoyable in the way of preserves than fig jam? Yet how little we see of it.

A big demand has already sprung up for figs for jam-making, and away out on this country the product could be turned out by the ton. I would like to see the question of settling this country taken up properly. It means a great deal for Queensland. It means close settlement; it means production and prosperity in the place of nothing, practically.

Fancy the transformation that would occur! In place of the present wilderness of miles and miles in extent, we would see happy homes, good substantial dwellings, beautiful gardens and orchards, thriving farms, and a smiling people! What a change from drought, dust, and despair! What a jump from starvation to plenty! We can and ought to have repeated here what is being worked out on the arid areas of the States of America. There the transformation has largely been accomplished, and the results are marvellous. There is no doubt of the wealth-giving power of what the Americans have done and are still doing, and there need be no doubt in our minds of the results here if we only tackle the business properly. I am aware that in this matter as in all things worth attempting certain difficulties will have to be overcome, and brains and intelligence applied at all points, and the people who would settle on this country require lifting along in some ways. But with regard to all the agricultural work involved in this article it may well be remembered that the intelligence and resources of this Department are available for the help of settlers. Information and instruction can always be obtained, and every step of the way made clear to the man who does not know his way.

Let any intelligent observer visit this district, see what has been already accomplished on the places I have mentioned, and I believe he will come away impressed not only with what he has seen, but still more with the idea that things are possible that have not been dreamt of.

MARKETING ORANGES.

Hints on Picking, Packing, and Shipping.—Dry weather is best for picking oranges, but if they are dried before being packed no injury is done them by picking wet.

Gathering.—Oranges for market should never be pulled from the trees. Pulled fruit is looked upon with suspicion by the trade, and is usually sold as "drops." Great care should be taken to cut the stem smoothly and close, that it may not puncture the skin of the fruit next to it in the box. The finger-nails should be closely cut before attempting to handle oranges. Cut the fruit with clippers made for the purpose, which can be procured at any hardware store. A knife is apt to graze the fruit, which causes it to rot, even if the cut is too small to be noticed, and often leaves a protruding, sharp stem. The fruit when picked should be placed in receptacles, which protect it from being thorned, pressed, or bruised. Many of the largest shippers use cans or baskets shaped or adjusted to the body of the picker, and held by a strap over the shoulder. Some, however, continue to use sacks, claiming that heavy canvas sacks are much handier and less cumbersome than metal boxes, the proportion of thorned fruit being very slight. The most convenient size is 14 by 20 inches when laid flat, with straps to go over the shoulder, holding the top of the sack at the waist. When full they should be carefully emptied, placing the mouth of the sack at the bottom of the field box, and lifting slowly by the straps on the bottom of the sack.

Grove Boxes.—A handy and serviceable grove box is made from two panel-heads connected by stiff slats, three on each side, with ½-inch openings between and at the bottom corners to allow for ventilation. Boxes are of the same size and shape as the ordinary packing box, but do not contain the middle partitions. The heads should be hooped, and the slats planed on both sides, with the inside edges slightly rounded. These boxes should be placed about two-thirds full, so they can be stacked on top of one another, and the sides should be of sufficient thickness—depending on the kind of wood used—so that they will not bulge from pressure of the fruit. Some make the grove boxes smaller at the bottom than the top, with flaring sides like a tray, so that they will "nest." Remove the fruit from the picking receptacle by hand carefully, placing it in boxes: never pour it except from a sack, as above described. A freshly picked orange

is rigid, it has no flexibility; if pressed out of shape its tissues are ruptured, and it is ruined. Its skin is brash, the cells are distended with juice, the slightest bruise or scratch ruptures them and decay sets in.

Sorting.—Some prefer to sort in the grove. As the fruit is lifted from the picking baskets into the boxes, they sort and believe it to be better than sorting in the fruit-house. Careless pickers can be corrected at once, and when the fruit is taken into the house it can be piled as to its quality, and sized as one wishes—fancy, bright, or russet. Another good reason is that much less bin room is required, as one needs bins for only one quality at a time.

Curing.—Fruit should be taken to the packing-house and allowed to remain in the boxes in a cool, dry room until it slightly wilts—until evaporation renders the fruit flexible and its peel pliant; this usually requires two or three days, and in moist weather even a week. There are advanced growers, however, who claim that by the exclusive use of pure chemicals as fertilisers, they grow oranges with such a tough elastic peel that they can pack the oranges without injury directly from the trees. When properly dried or wilted the fruit can be pressed into the boxes so close and tight that it will be immovable, without injury, and will not afterwards shrink. Oranges do not "sweat"; the moisture which evaporates from them is invisible and imperceptible. The moisture which appears on the fruit after a cool night is condensed vapour, the same as drops of moisture on an ice pitcher. This often interferes with wrapping and packing, and it may be prevented by keeping up the temperature of the room or spreading the fruit out thin so that their temperature will remain the same as that of the room.

Cleaning.—If the fruit is scaly, sooty, or dirty, it will pay to wash it. A shipper, whose fruit has attracted a great deal of attention by reason of its beautiful appearance, recommends the following plan of washing, which he follows:—"We use a kerosene barrel, hung like a grindstone, with a little door on the side, 6 x 10 inches, on hinges, kept shut by hasp or button. Put in about three pecks of cypress sawdust (pine sticks into the fruit) and fill the barrel two-thirds with water, then put in two boxes of oranges, and turn thirty to sixty times; take out and dry. When people use barrels first they use little water and lots of sawdust, and hurt the fruit; but by using lots of water and little sawdust you will need to turn more times, but will not hurt the fruit. We do our washing on our wharf, where we have lots of water, and a place where we can expose the fruit to the sun and air to dry. After taking out of barrel, you will need to throw on some water to wash off what little sawdust may stick to the oranges. You will need to put in some more sawdust every little while, and always keep some wet in a pail, to put in when needed, as it does not work well until wet up. If the fruit is nearly all in condition to be improved by going through the barrel, we let it go; but, as we don't think it is any real benefit to it to have it run through, we are governed by condition of fruit. The best gearing I have seen is a regular grindstone gearing, having the shaft rest on two little wheels.

Grading.—If the sorting has been done as the fruit comes from the trees when it is ready for handling, separate the russets from the brights, discarding all imperfect and damaged fruit. Each is then separated into two grades. The smooth-skinned, unblemished, bright fruits are hereafter known as fancy, and go to market with this plainly marked on the box. The rest of the bright oranges go as simple brights. The dark fruit is divided into two grades, the lighter, called golden russets. Drops, culls, scaly and coarse "calico" fruit, if shipped at all—it should not go out of the country—should be packed by itself, and its quality marked honestly on the box, but not the owner's name. It seldom pays to ship this inferior fruit; it merely serves to depress the market. Creased fruit is a different matter; it is usually of a superior quality, and if not held too late, and carefully handled, it will bring good values. The fruit should be graded before being sized, though one grade may be sized as it is handled for the purpose.

Sizing.—All fruit should be sized. If the crop is too small to justify buying a machine, a home-made device can be used; but, however small the crop, it must be sized to bring its worth in the market. There is an excellent sizer called the "pneumatic," and one adapted for a small crop, manufactured in De Land, Florida. The sizer should be adjustable and gauged tight, so as to secure uniform pack all the while.

Wrapping.—From the sizer, the fruit goes to the wrappers, who cover each orange neatly with a paper tissue wrap, deftly fastening it with a final twist. It will pay every good grower in the end to wrap his fruit in papers on which are printed his name and distinguishing device. A leading packer says:—"From the bin, we wrap and pack directly into the boxes, they having been neatly stencilled first. Where intelligent help is employed, each wrapper can pack his own fruit as he wraps." Some use coloured wraps for the top edge, and put a display card 11 inches by 11 inches in each box. A careful packer says:—"I believe all wraps should be printed with the grower's name. If his fruit is not good enough, it is not good enough to go to the market at all. It adds much more character to the package than coloured paper, which I have discarded."

Polishing.—Some polish their oranges by passing them through brushing machines, of which there are several good patterns.—*Florida Fruitgrower and Farmer.*

NOTES ON IRRIGATING ORCHARDS AND VEGETABLE GARDENS.

By ALBERT H. BENSON.

Over the greater part of this State the question of irrigation for the production of fruit and vegetables is a matter of vital importance in all seasons; and, even in our better-watered coastal districts, the rainfall is usually so erratic that there are few years when the judicious use of water will not be found profitable during one or more portions of the year. Even in the best seasons there are dry spells of greater or lesser severity, when the use of water would save or mature a crop that would otherwise be lost or at best greatly diminished. This being so, I am induced to write the following notes, in the hope that they may be of some value to our growers, and will give them an idea of how best to obtain and apply water to their particular crop or crops.

In the first place, it is evident that the possibilities of irrigation depend entirely on there being a supply of suitable water available for the purpose, and it is the question of supply that I will first deal with.

As the fruit and vegetable industries are not confined to any one portion of the State, but are scattered all over it, it is impossible to devise any one scheme—or even several schemes—of irrigation that would benefit a large number of growers, as the bulk of our orchards and gardens are widely separated from each other, and, in the majority of cases, the individual grower will have to secure his own supply of water and provide his own scheme for distributing same; and it is to help such that the present notes are being written.

Supply of Water.

In many instances, the only means of obtaining a supply of water will be by conserving the surplus rainfall by means of dams or tanks or a combined dam and tank. Gullies or watercourses, carrying more or less water during heavy rains, can be dammed, and the water, which would otherwise be lost, be conserved for use during subsequent dry spells. Such dams would, in many instances, be neither difficult nor expensive to construct, and would conserve a large body of water. Care would, of course, have to be taken in their construction so as to prevent leakage, and also to prevent their being carried away

during floods, the latter being prevented by the construction of a suitable byewash to carry off all surplus water. Another source of supply is by means of wells, and this in many of our river flats is a cheap and satisfactory manner of obtaining water that is not taken advantage of to anything like the extent that it should be. Good supplies of water are also obtained from wells in many parts of the Downs and other districts, and this source of supply is also greatly neglected.

There is also the supply available from our running creeks, lagoons, and permanent waterholes, and the supply from these sources could be largely increased by a proper scheme of water conservation.

There are very few places in coastal Queensland suitable for fruit and vegetable culture where it would not be possible to conserve surplus water, either by means of dams or tanks, or on which a supply could not be obtained from wells; so that it is to the interest of the fruit-grower and vegetable gardener to conserve or obtain such supply, as it will not only prove a profit to the individual but to the State generally.

The question of utilising the water from our bores, other than the shallow ones of the Downs, is outside of this paper, as so much depends on the quality of the water—some being very suitable and others distinctly detrimental to all plant life.

Means of Raising Water.

The means to be employed for raising water will depend entirely on the quantity of water available, as it is no use to erect pumping machinery in excess of your supply; but, given a satisfactory supply, they will be governed—first, by the quantity of water required; and, secondly, by the height the water has to be raised. There are many methods of raising water, and, as few growers or gardeners know which is best adapted to their particular requirements, I will give a brief description of the most suitable.

In the first place, I will deal with the question of raising water to a small height, say from a dam, creek, waterhole, lagoon, or shallow well; the water to be delivered at or slightly above the level of the ground from which it can be distributed by gravitation. For this purpose the following will be found most suitable:—

Water Lifts.

Several simple mechanical contrivances, such as the California pump, bucket pump, and chain pumps, are suitable for this purpose. They are exceedingly simple in their construction, and not liable to get out of order. They can be worked by hand, horse, steam, or wind power, and raise a large quantity of water to a small height for a small expenditure of power.

They are largely used by Chinese gardeners on account of their simplicity, and are usually worked by means of a whim or horse-gear. They will pump water containing sand or silt without choking, and can also be used for semi-fluids such as liquid manure.

They are of most value when the total lift does not exceed 25 feet, but above this height the loss, especially in the case of chain pumps, is too great to render them a profitable means of lifting water.

There is one other simple means of raising water under similar conditions—namely, by means of a whip worked by a horse: a simple arrangement that can be fixed up by any farmer for a small cost. The writer has recently seen a water lift of this type being used by a Chinese gardener in the neighbourhood of Brisbane, the total cost of which, including the digging and slabbing of a large well, amounted to only £25, and which was raising about 5,000 gallons of water per hour a height of 20 feet, one horse being used to do the work.

Different kinds of water lifts are obtainable from our implement sellers at reasonable rates, but as in the case of a whip they can often be economically constructed in the orchard or garden, as there are no mechanical difficulties in their construction or fitting up that cannot be carried out by any handy man.

The following mechanical contrivances are also valuable for raising large bodies of water to a small height, but they differ from water lifts in that they are capable of forcing water to a limited height. Of these, the most important is the Centrifugal Pump.

This pump has the power of sucking water for a few feet and forcing it a height of 20 to 25 feet. To do good work, the suction should not exceed 5 feet and the force 25 feet, a total lift of 30 feet, but given increased power the pump will work up to as much as 40 feet of total lift, but beyond this, other pumps are to be preferred.

Under favourable conditions no pump will do more work for the power employed than the centrifugal, or is better adapted for irrigation purposes, especially when a large body of water is required, such as in the case of a large orchard or garden on level land adjoining creeks, lagoons, &c. It will deliver the water at or a few feet above the level of the bank of the creek, &c., as desired, provided the total lift does not exceed that already mentioned, and the water can be distributed thence by means of gravitation.

A centrifugal pump requires to be driven at a high speed, hence a combined engine and boiler is best adapted to work it when a large supply of water is required, but small pumps may be worked by a high speed horse-gear or geared windmill.

Full particulars as to the price of different sized pumps and of the machines necessary to work them can be obtained from any implement house, the cost depending entirely on the quantity of water required.

Rotary Pumps.

Like the centrifugal, these pumps require to be worked by an engine, horse-gear, or geared windmill, but are not driven at anything like the same speed. They answer the same purposes as the centrifugal, but will force the water to a considerably greater height if necessary, but the total lift should not exceed 60 to 70 feet. They, however, do their best work at moderate lifts, as even at the heights mentioned other pumps to be mentioned later are much more satisfactory. They are made in small sizes, and are useful for the small grower who only requires a supply of 2,000 or 3,000 gallons an hour. They are inexpensive, not liable to get out of order, and are easily worked. They are obtainable from most machinery agents.

There is also one other type of pump suitable for moderate lifts—viz., the pulsometer, which does its best work when the total lift does not exceed 40 feet, though it will force water to a greater height, but to do so requires a considerable increase in power. It is a direct acting steam pump, though its principles and mechanical construction are entirely different from ordinary pumps, and requires a boiler to work it. It is an easy machine to work, and not liable to get out of order. In actual practice a pulsometer driven by a 4 nominal horse-power boiler will lift from 3,500 to 4,000 gallons an hour 40 feet.

We now come to the question of where water has to be raised from a greater or lesser depth to the surface, and then forced to the land that it is desired to irrigate.

This necessitates the use of totally different pumps to those already described—viz., that of combined lift and force pumps. It is essential that pumps of this type shall be placed as near the water to be raised as possible, for though they will lift water by suction a height of some 30 feet theoretically it is found in practice that it is not safe to allow more than a maximum lift of 25 feet; and even this should be reduced whenever possible, as the shorter the suction the less chance of leakage, and any leakage, no matter how small, greatly reduces the capacity of the pump. These pumps lift by suction, and then force to any height or distance that may be necessary, the quantity of water required and the height to which it has to be forced governing the size of the pump and the power necessary to work it. These pumps will lift water from any source of supply, and are made in all sizes from the small hand pump capable of raising a sufficient supply for household purposes to the most powerful steam pumps capable of raising many thousands of gallons per

minute. They can be worked by any power that may be available, but the most suitable for the purpose I am dealing with are windmills and steam boilers. The former is probably the cheapest way of raising water for the small fruit-grower and gardener where a good supply of wind can be depended upon, and where only a moderate amount of water is required. The quantity of water raised by means of a windmill working a combined lift and force pump depends, of course, primarily on the amount of wind, but given a fair wind it depends on the size of the mill and the height the water has to be raised. When the total lift does not exceed 50 feet, a 12-foot steel mill of any of the improved makes should, given a fair supply of wind, be able to raise enough water to irrigate 10 acres of fruit trees or 5 or 6 acres of vegetables, provided that there is a reservoir to contain a supply of water during such time as there is a failure of the wind. Such a mill will raise water much more than 50 feet, but the quantity of water raised will decrease in proportion to the height it is to be forced—in other words, the area capable of being irrigated decreases with the height the water has to be raised.

Windmills and windmill pumps of all kinds and suitable to every class of work can be obtained from any machinery agents, who will give full particulars regarding them; and the price complete, including tower, pump, piping, &c., will vary, according to the size of the mill, height of tower, type of pump required, and height the water has to be raised at the mill itself, from £20 to £50; though these prices can be reduced if suitable timber for the tower can be obtained on the spot at a small cost. Home-made windmills can also be constructed at a cheap rate; and though, as a rule, they are not capable of doing so much work as those of the latest improved type, they are often very useful, especially where the lift is small and cost is a consideration. When a large quantity of water is required, steam pumps of various makes, such as the Worthington, Deane, Marsh, &c., are to be preferred. The two first of these are double acting—viz., have duplex cylinders; but the Marsh is a single acting pump. They are made in all sizes and will force water to any desired height, the quantity raised depending on the capacity of the pump and the height to which the water has to be raised.

All steam pumps are direct acting—that is to say, the steam from the boiler is conveyed direct to the steam cylinder of the pump, no engine being required. The pumps mentioned are the best of this type, are simple in their action, and not liable to get out of order if used with ordinary intelligence. The price is not excessive, as a plant capable of forcing, say, 3,000 or 4,000 gallons of water per hour to a height of 100 feet should not exceed £100. This, of course, does not take into consideration the cost of the piping from the pump to the point of distribution, as that is a question of distance.

There is one type of pump that I find I have omitted, and that is the Abyssinian or drive pump, which is valuable for obtaining water from shallow depths such as river sand or the water strata of valleys adjoining rivers. The digging of a well is not necessary, as the bottom of the pipe through which the water is pumped is fitted with a specially-made hardened steel point somewhat larger than the pipe immediately above it, which is perforated and lined with strong gauze. This is driven down till the water level is reached, when a common suction pump is attached to the top of the pipe at or slightly above the surface of the ground, and this can be worked either by hand, windmill, or other power. The total lift of the water should not exceed 25 feet. I now come to the last question that I will deal with in these notes—viz., when water has to be raised from a bore that does not flow. This requires a special type of pump known as a deep well pump, which consists of a plain cylinder which is placed in the bore either in the water or close to it. This cylinder can suck water 25 feet and lift to any height, but will not force unless connected with a special pump head. It is most valuable for irrigation, as it will raise a large body of water at a small expenditure of power to the surface, and can be worked by either windmill or steam power, a special type of steam pump being made for this purpose.

In using a deep well pump it is advisable for the suction to be as small as possible—that is to say, the cylinder had best be placed either in the water in the bore or close to it, as this insures against possible loss of power by the suction of air instead of water.

Deep well pumps are largely used in California for irrigating orchards and vegetable gardens, and are found to be the simplest and most satisfactory means of raising water from wells or bores in which the water is more than 25 feet from the surface, or when the total height that the water has to be raised without forcing exceeds 25 feet. Having now dealt with the question of raising water, I come to that of distribution, and this will apply equally in the case when the water is raised to the surface or slightly above it and is thence distributed by gravitation, or when it is raised to the surface and thence forced to the highest part of the land to be irrigated and distributed from there.

In most cases the quantity of water available will not be sufficient for distribution by means of raised ditches and open channels, so I will leave this means of distribution for the present and will confine my remarks to the distribution of comparatively small quantities of water so as to minimise loss and secure the best results.

In the first place, it is necessary to provide a cheap method of conveying the water to the trees or vegetables, and this can be done by means of canvas hose of any desired length or by means of a system of light portable galvanised piping, as there is no pressure on the distributing piping, the water running by gravitation. For example, say that the water is raised from a creek into a 400-gallon tank, placed on the bank which is higher than the land to be irrigated; all that is required is to fix a discharge pipe near the bottom of the tank to which the canvas hose or portable piping is attached, and the water is conveyed thence to the trees or vegetables that it is desired to water.

Light galvanised piping can be obtained in Brisbane at the following prices, viz.:—3d. per foot for 2-inch; 4d. per foot for 3-inch; and 5d. per foot for 4-inch inside diameter, the piping being in 12-foot lengths and fitting together like stove pipes. Such a piping can be quickly laid down and fitted together, and can be transferred whenever required, a few L and T connections completing the plant, so as to direct the flow of water in any direction that may be desired.

Such a system of distribution is applicable either to hillsides or level ground, and secures the carrying of the water to the point to which it is required to be applied with very little loss, as the leakage from the pipes is trifling.

The method of applying the water will depend largely on the slope of the ground, the nature of soil, and also of the crop to which it has to be applied, but in order to save water it is advisable that the flow in open channels should not be excessive; that is to say, only a short distance—say 20 to 30 yards, according to the soil—should be watered at once. All vegetables should be grown in rows, the rows following the contour of the ground, and should be irrigated by furrows between the rows. Each irrigation should be followed by cultivation to prevent the caking of the surface and consequent loss by evaporation, the depth of the cultivation depending on the nature of the crop to be watered.

In irrigating fruit trees the water should be applied in deep furrows, or on hillside land, in trenches cut on the upper side of the tree, as by this means the water will sink deeply into the soil, and will thus come into reach of the main feeding roots, whereas if applied on or near the surface it will tend to the formation of surface roots, which suffer with every dry spell, when the deeper roots will not be affected. Both furrows and trenches should be filled in as soon as the water has soaked in well, and the soil will not cake, as doing this will prevent evaporation and thus save water. In the case of fruit trees a steady soaking for an hour or longer, by means of a comparatively small supply of water, is preferable to applying the water too rapidly, as the slow absorption will penetrate deeper and spread further in the soil. A thorough, deep irrigation is of more permanent value than several surface waterings.

Viticulture.

THE PREPARATION OF MALAGA RAISINS.

By VICTOR SEBASTIAN.

(Translated by E. H. RAINFORD, Viticulturist.)

The following description of the methods used in the preparation of Malaga raisins by M. Sébastian may be of some interest to Queensland fruit-growers. It will be seen that the preparation of choice quality raisins requires skill and practice as well as the right climate and variety of grape. If we ever produce raisins in this State, the pudding raisin appears to be more easily obtainable than the choicer qualities; but no serious attempt has ever been made to prepare raisins in a rational manner so far as is known. Some portions of M. Sébastian's article have been deleted as not necessary to the description, and to economise space:—

"The best variety of grape for the preparation of raisins is the Moscatel or Muscat of Alexandria. Next comes the 'Almunecar,' with superb oblong translucid berries with abundance of tasty pulp; generally concave on the side of the longitudinal axis of the bunch. It is known under the name of the Raisin grape at Motril, Albunol, and Almunecar, localities situated near the coast 70 kilometres east of Malaga, which appears to be its place of origin. Likewise the Joannes of Almeria, or Loja of Malaga, the Pedro Ximenes, the Lauren of Malaga; but the best Malaga raisins are made from the Moscatel.

"There are two methods of making raisins—one called the 'escaldado'; the other 'al sol,' by scalding or by the sun. The first is without doubt the most ancient, and perhaps had its origin in the East, for frequently in the neighbourhood of Mascara are seen Arabs practising it in its most primitive of methods—that is to say, with ashes, and wheat straw for a vegetable colouring matter. In these times the lye is made simply with carbonate of soda, prepared according to the data of Solway. The carbonate slightly retards ebullition, a saturated solution boiling at 220 degrees. We will begin by describing the scalding method, although it is falling more and more into disuse, its products being of inferior quality and less in demand by consumers.

"An iron boiler of varying capacity, but generally containing about 45 gallons, is fixed on a fireplace in the same locality where the establishment is to be set up. The workman in charge of the scalding puts approximately 2¼ lb. of carbonate of soda in the boiler full of clean water. A quick fire is made so as to bring it rapidly to a boil. To give an aroma and yellow colour to the water, he immerses for an instant in the boiler a packet of *Artemisia campestris* (wormwood); the lye is carefully skimmed during the operation.

"The dipping of the grapes is rapid; it is effected by means of a kind of wire basket containing from 7 to 9 lb. of fruit.

"On emerging from the bath, after a few seconds' exposure to the air, the skin of the grape should show very fine, almost imperceptible, cracks; if the cracks are too plain it means that the lye must be weakened by the addition of water, in the contrary case it is strengthened by adding a little soda; sometimes potash is used instead of soda with the same effects. The scalded grapes are at once taken to the drying place, where women provided with scissors examine the bunches and lay them side by side either on the bare ground or else on reed mats which allow them to be removed without difficulty in case of rain. The examination is quickly finished, for the bunches are always carefully cleaned of damaged berries before being dipped in the boiler.

"If the temperature is high, if the sun's rays are powerful, drying is completed in seven or eight days, more quickly than by the Malaga method.

"It is reckoned that more than three arrobas of fresh fruit are required to make one arroba of raisins. The arroba in the Gandia district equals 26½ lb.

"I repeat that with the scalding process the raisins obtained from white grapes (*pasa escaldada*) are less esteemed by the trade and experts than those of a darker colour (*pasa de sol*) obtained according to the procedure customary at Malaga, which I will now describe:—

"The Muscatel vines are generally cultivated on half trellis or bush fashions. Their shape resembles the goblet with four or five spurs as adopted in Languedoc and the Algerian provinces. When the grape is full-grown and the time for cutting them is near, the dry pulverulent earth is heaped up around the stock so as to form a sort of cone upon which the greater part of the bunches rest. This practice has for its object to obtain the perfection of maturity, an elaboration of sugar as intense as possible, for the earth stores up heat which the grapes profit by during the night.

"The cutters carefully detach the bunches of grapes by cutting the stalks with a knife or scissors. They choose those that are perfectly ripe, sometimes even only a portion of the bunch, and carefully remove and place them on an osier pannier measuring about 2 feet in diameter; this flat basket is carried about by the labourer either on his head or under his arms.

"The sun-drying, which concentrates the juice of the grape by evaporating the watery part, is done on *paseros de toldos* and *paseros de madera.* These last only exist on mountainous regions on ground inclined at an angle of 35 degrees to 45 degrees. They are built up of walls forming a kind of square box, in which are spread a layer of figs or grapes to avoid the ill effects of nocturnal radiation and dew, and these *paseros* are covered over with planks every evening, hence the origin of the term *paseros de madera*, or paseros of of wood; the word pasa in Spanish means grapes dried in the sun.

The following system of *paseros de toldos*, or *paseros* of cloth, is much more common. A small ditch is dug, delimitating the *pasero* and protecting it against the entrance of water in case of storms, &c. The usual dimensions are about 13 feet breadth by 33 to 36 feet in length. A stake at each corner is driven and cross each other in an X shape, forming a rest supporting a pole, on which is rolled and unrolled a cloth according to the atmospheric conditions. This, it will be seen, forms a tent whose open ends are shut with reed mats. The ground is covered with a layer of sand or powdered charcoal, which here plays the part of accumulator of heat. The bunches, freed from spoilt and injured berries, are laid down close together; they are turned from time to time, so that each side of the bunch receives the direct rays of the sun. If fine weather prevails, the operation is terminated in a fortnight; an ardent sun is not to be feared on condition that the air is not too dry. At Malaga, it is the north and north-north-west winds that is feared as much as rain.

"Packing is a tedious work, requiring intelligent, practised men. The workman sitting down, having near at hand the raisins, holds on his knees a little board, with a raised edge about 2 inches high, like the lid of a box. This board is of the dimensions of the packing case, and lined inside with sheets of paper, which project considerably over the edges. The workman extends a bunch upon the left hand, and gently detaches with scissors the ramifications or prominent wings so as to make it somewhat flat. In fact, when this first pruning is completed, the bunch appears to have been pressed, but this is not the case. Placed in position, the workman examines it with care, and adroitly fills up the spaces with berries taken from other bunches. Each berry is then flattened with pressure between the thumb and finger, then curved outwards with a push of the latter. This delicate operation is done by pressure, for it is necessary to avoid any rubbing which would cause the bloom to disappear, to which the trade attaches a value. As soon as the board is completely covered, the workman takes hold of the sheets of paper and lifts them with their load; the whole is introduced into the packing case, and the paper turned down, making a protective covering for each layer of raisins.

"A good workman prepares six layers a day, or a case and a-half. If he is skilful, he receives a pay of 2 fr. 25 to 2 fr. 50 per diem (1s. 10d to 2s.) besides food."

Some extracts are also given from a paper read at the Viticultural Convention, held at San Francisco in 1888, on the "Raisin Industry in California":—

"The most practical method of drying is by use of trays placed upon the ground. The almost entire absence of dew in our locality greatly facilities this method. The trays are usually 24 inches by 36 inches. Those of larger dimensions are found inconvenient to handle when filled. Trays of the former size hold about 20 lb. of fruit, and should produce from 6 lb to 7 lb. of raisins. The trays or platforms are taken into the field and distributed along the sides of the roads, from which they are taken by the pickers as they are wanted. As the grapes are picked from the vines, all imperfect berries, sticks, and dead leaves are removed from the bunches, which are then placed upon the trays right side up. A cluster has what is called a right and a wrong side, the wrong side having more of the stem exposed than the right side. Great care should be used in the picking so as to handle the bunches only by the stem. If the berries come in contact with the hand, some of the bloom will be removed, which will injure the appearance of the raisin.

"The trays are placed after filling between the vines, one end being elevated so that the grapes may receive the more direct rays of the sun.

"The length of time required for drying depends much upon location and conditions favourable or otherwise. I have known raisins to be dried in seven days, but they were not a good article, and too rapid drying is not desirable.

"The grapes are left upon the trays until about two-thirds dry, which with us will be in from six to eight days; they are then turned. This is accomplished by placing an empty tray on the top of the one filled with partially dried raisins, and turning them both over. Then take off the upper or original tray, and you have the raisins turned without handling or damage. After turning curing will proceed more rapidly, and frequently is completed in four or five days.

"During this time they should be carefully watched to prevent any from becoming too dry. When it is found they are dry enough, the trays are gathered and stacked one upon another as high as convenient for the sorting which follows. This protects them from the sun, and prevents over-drying. Stacking should be attended to early in the morning whilst the stems and berries are slightly moist and cool from the night air, as they will retain this moisture after being transferred to the sweat boxes and assist in quickening the sweating process.

"The trays which have been stacked are now ready for sorting and grading, and this requires care and judgment, and, although a tedious process, greatly facilitates rapid packing. The sweat box is a little larger than the tray, and about 8 inches deep. When filled these will contain about 125 lb. of raisins. Heavy Manilla paper is used in the boxes, one sheet being placed in the bottom and three or four more at equal distances, as the filling progresses. The object of the paper is to prevent the tangling of the stems and consequent breaking of the bunches when removed for packing. The sorters have three sweat boxes; one for first, second, and third qualities, as the grade will justify. The bunches should be handled by the stem and placed carefully in the sweat boxes to avoid breaking the stems, thereby destroying the symmetry of the clusters. Any found too damp are returned to the trays, and left a day or two longer in the sun. To ascertain if they are perfectly cured, take a raisin between the thumb and forefinger and roll it gently until softened, when either jelly or water will exude from the stem end; if water it requires further drying. When the boxes are filled they are taken to the equaliser. This should be built of brick or adobe, and as near airtight as possible, but provided with windows to allow ventilation when necessary. The windows should have shutters to keep it dark. The filled boxes are placed one on another to a convenient height, and should remain from ten to twenty days or more, when they will have passed through the sweating process.

"As the raisins are taken off the trays, some of the berries on the bunches will be dry enough, and a few will not be sufficiently cured. To remove the moist ones would destroy the appearance of the cluster, and to leave it out longer would shrivel the dry ones; hence the sweat box. The moisture is diffused through the box, some being absorbed by the dry raisins, and the stems also taking their share, and are thus rendered tough and pliable and easily manipulated when packing.

"The most convenient mode of packing is by the use of a metal tray, corresponding in size to a layer of raisins and having a loose bottom. The raisins are placed in the preliminary packing tray with the face of the cluster downward, which gives the surface a level appearance and prevents the exposure of the stems. When the bottom of the packing tray has been covered, which should always be with perfectly shaped berries and bunches, the tray is filled to the requisite weight of 5 lb. The contents of the tray are then pressed sufficiently to pack the raisins firmly together, but not with such force as to break the skin, causing the jelly to exude and consequent early sugaring.

"After being pressed they are transferred to the boxes, during which process the paper is wrapped round each layer. The paper is placed on the top of the tray of raisins, and a sheet of steel the exact width of the tray is placed above the paper and the whole reversed. The sheet of steel serves to hold the raisins in place until the layer is put in the box, when the steel is withdrawn and the layer drops into the box face upwards."

The standard box of California raisins is 20 lb. weight, containing four layers of 5 lb. each.

HOW TO SLIDE A LOG EASILY.

Mr. J. Wilson, of Howdonville, Beerburrum, sends the following suggestion for lifting the front of a log to enable it to be easily skidded:—Two pieces of iron of the shape shown in the illustration, and ½-inch thick, are attached to

the ends of an old trace chain. A knot is tied in the chain to keep the centre true. The dogs are then driven into the log at each side. Then, with the axe, a chip is taken out of each side of the front end of the log, as shown, to admit the chain. As the horse pulls, the end of the log will rise clear of the ground and slide with ease.

Plate XXV.

Some Noted Tea Roses.

Horticulture

TEA ROSES.

By GEORGE WATKINS.

Papers read before the Horticultural Society of Queensland at the August and September Meetings.)

IF asked to recommend any family of roses for sole cultivation in Southern Queensland, I should, and I think we all would, unhesitatingly say—tea roses.

With us the H.P. represents the aristocracy of the race. For depth and beauty of colour, massiveness of bloom, and richness of fragrance, they stand pre-eminent, but did we depend upon them for a constant supply of flowers we should find them to the front for only a short time in the year—viz., in the early summer.

The Hybrid Tea is exceedingly valuable, and is the family of which we have the highest expectations. It is probably the coming race. We have a few excellent varieties of this class, but most are poor growers, weakly in constitution, and given to a short life, if a merry one.

The Bourbon family is a small one, with only one or two representatives to be recommended.

The Noisettes, though many are decidedly distinct, merge gradually into the Tea family, and the National Rose Society catalogues both groups in one, and they are almost universally united in exhibition catalogues.

It is becoming increasingly difficult to say, with roses, where one class begins and another ends, or to define distinctive peculiarities for any single class.

The American system of making two classes only—viz., summer blooming and ever blooming—has some advantages; but, after all, it is as incomplete as any other classification, and fails to give any idea of the habit or origin of the individual plant.

For a combination of good qualities, constancy of bloom, perfection of form, variety and charm of tints, with delicacy of fragrance, we go to the Tea family.

The China family (*Rosa indica*), sometimes called the Bengal, was introduced from China about 1789, but the first of the distinctive teas, a pink, or rather blush variety, reached us in 1810. This was followed by a yellow variety about fourteen years later. There is no doubt both originated from the Chinese rose.

These two later varieties, for distinction, became known as the tea-scented Chinese (*Rosa indica odorata*), and were the primary parents of what we now generally speak of as tea roses.

The habit of both China and tea roses is somewhat similar. The flowers of the first are small and somewhat irregular in shape, and are seldom seen on the show table. The teas are supposed to have the fragrance of a newly opened tea-chest. To me this seems a matter of imagination, and I think the responsibility of the name is due more to the association of the words "tea" and "China" than to anything else.

I don't think there is need to go into the matter of cultivation in this paper.

Anyone wishing to succeed in rose-growing must cultivate the ground deeply and thoroughly. To ensure success with any crop, real work must be put in, and certainly is requisite with roses. Surface scratching of the soil, and

allowing it then to become as hard as a well-used road, will not do. Dig deep and keep the soil loose, and under ordinary conditions of weather anything will grow in our climate; certainly roses will.

Having done this and kept on doing it, there is one other requisite for the hungry soils of our neighbourhood—viz., frequent manuring. If you get too much wood, stop the supplies a little, but you will not get a succession of fine flowers unless you feed well.

The two main requisites are undoubtedly thorough cultivation and plenty of manure; with these roses will come. There is no doubt about it, and there is really no other secret about rose-growing.

To start, obtain good varieties. That is easy enough. Watch the roses shown at our monthly meetings and take notes, remembering at the same time that some varieties are pre-eminently suited for the show table, while others are better for cutting and garden decoration. This will be more fully spoken of under the head of varieties, towards the end of the paper.

Opinions differ as to whether tea roses are better on their own roots or budded on other stocks. Many of the hybrid teas seem to give best results on their own roots. With a good stock, I think pure teas do best with us on budded plants.

Pruning.—The best results are obtained by constant light judicious pruning after the recurring blooming periods.

Teas require less pruning than hybrid teas, and varieties among teas require a little different treatment. A beginner, with observation, will soon teach himself. Do not meddle with strong-growing young shoots. They should be left severely alone. Remove all thin, spindly ill-placed wood, for such can never produce good flowers. Buds likely to form badly placed wood should be rubbed off and spreading growth encouraged. It should be remembered that you must not expect a rose to grow into a perfectly symmetrical bush trained and trimmed into fanciful figures like the shrubs in the old-fashioned Dutch gardens. This might be done, but the result would not be good flowers. The strong shoots which occasionally break out must be given a chance, but old spent wood, discoloured and unhealthy, should be cut away without mercy.

Granted sufficient moisture, our plants are always growing and we have no true resting period such as obtains in Great Britain and the southern colonies. The yearly severe pruning practised there, and which is sometimes naturally done by severe frost, is not advisable here. I believe the professional gardener is frequently too much influenced by old training and tradition and uses the knife too freely on tea roses. Old wood and thin wood must go. Young and vigorous wood should be left almost alone, for it is on such you may expect the best flowers.

Varieties.—Many of the best of these are among the oldest. For instance, Adam, raised by Adam in 1833, the name being thus appropriate in more ways than one; Devoniensis, by Foster, 1838, and of which the climbing variety appeared in 1858; Safrano, by Beauregard, in 1839; Cloth of Gold, by Coquereau, in 1843; Niphetos, by Bougere, in 1844, the climbing variety by Keynes, 1889; Souvenir d'un Ami, by Defougere, in 1846; Mde. Bravy, by Guillot, in 1848; Gloire de Dijon, by Jacotet, in 1853; Souvenir d' Elise Vardon, by Marest, in 1854; Rubens, by Robert, in 1859.

It will be noticed that with the exception of Devoniensis we are indebted to French growers for the whole of them, and the list contains two of our best show roses.

Gloire de Dijon has become the parent of a large family of good climbing roses known as the Dijon teas. The best of these is Duchesse d' Auerstadt. Our climate is too warm and forcing for Gloire de Dijon. In colder lands it enjoys the character of being the hardest of all tea roses.

From 1860 we have had one or two good Tea roses every year, the most notable being: Catherine Mermet, 1869; Marie van Houtte, 1871; Perle des

Jardins, 1874; Madame Lambard, 1879; Francesca Kruger, 1880; Etoile de Lyon, 1881; Edith Gifford and Souvenir de Thérèse Levet, 1882; Madame de Watteville and Sunset, in 1883; The Bride, 1886; Ernest Metz, 1888; Medea, 1891; Maman Cochet, 1892; Muriel Grahame, 1897; White Maman Cochet, 1898; Mrs. Edward Mawley, 1900.

The coveted distinction of the gold medal of the National Rose Society has been won by the following tea roses:—Souvenir de S.A. Prince, in 1889, this was raised by G. Prince, of Oxford, but is better known in Australia under the name of The Queen; Muriel Grahame, in 1896; Mrs. Edward Mawley, in 1898; Sunrise, in 1899; and Mrs. B. R. Cant, in 1901. Mrs. B. R. Cant was raised by B. R. Cant and Sons, Sunrise by Piper, and the other two by A. Dickson and Sons.

Last year our society drew up a list of the best twenty roses to grow in the neighbourhood of Brisbane, based upon a plebiscite of our rose-growing members. In this list the following true teas found places in the order following:—1, Maman Cochet; 2, Niphetos; 4, Souvenir de la Thérèse Levet; 5, Marie Van Houtte; 8, White Maman Cochet; 10, Perle des Jardins. The Noisette rose—Maréchal Neil—occupied third place.

Varieties to Grow.—It must be remembered that we grow roses with different ends in view. One grower devotes his time to raising blooms of exhibition standard; another cares not so much for individual excellence of flower as to having his garden a mass of bloom; while a third prefers flowers for cutting for decorative purposes. Some varieties are valuable in all three directions, while others are pre-eminently so in only one.

For exhibition we require roses whose chief characteristics are beauty and perfection of form, combined with size, brightness, and distinctiveness of colour. These qualities do not always go with vigour of growth and abundance of bloom. If they do, we have roses which deserve pre-eminence, but, unfortunately, a few splendid show varieties are only to be grown for show purposes.

For garden decoration we are not so interested in the perfect elegance and symmetry of the individual flower. We require quantity rather than quality, with a healthy and vigorous habit of growth.

If the desire be for the purpose of cutting for decorative purposes, either for personal wear or the adornment of our rooms, we are not so anxious for size. We are careful to secure flowers which are most attractive in the bud. We require beauty of form, brightness of colour, with as much as possible of that character too often neglected—namely, perfume.

Freedom of bloom is a leading consideration, and white varieties are desirable.

It is not often that all these qualities are combined in a single variety, and our estimation of the value of a variety must be largely influenced by the purposes for which we require it.

It seems to me a great pity that our nurserymen in compiling their catalogues do not give us more of their own opinions in the matter of description. As a rule, the descriptions are only transcripts from those of the raisers, and describe the plants as they do when grown under glass. The condition of growth with us is entirely on a fresh basis. Hence, catalogue descriptions are frequently most misleading.

A great deal might be said on this head, but it hardly comes within the scope of this paper. Suffice it is to say that catalogue language is peculiar, and requires to be read with understanding.

Exhibition Varieties.—I use this term with very much diffidence. It does not mean that a rose which we class as an exhibition variety is only fit for such purpose, for we shall find that many of them are most valuable for other purposes.

Beauty of form, with fair amount of size, is the point of perfection. Size without symmetry of form is valueless on the show table. There must be no

malformation of bloom or symptoms of a double heart. What is required is a regular shape, with full, somewhat high centre, smooth, circular outline, and perfect arrangement of petals. A long rose is preferable to a globular rose, and a globular to a flat rose. There must be no suspicion of the eye in sight. Then add size, if possible, brightness of colour, and fragrance. The last, valuable though it be, is a point that can never be estimated on the show table.

Three leading experts were requested last year by the National Rose Society to draw up a handbook, "How to Grow and Show Tea Roses."

Their list of twelve best exhibition tea roses is as follows, arranged alphabetically:—1, Bridesmaid; 2, Catherine Mermet; 3, Cleopatra; 4, Comtesse de Nadaillac; 5, Innocente Pirola; 6, Maman Cochet; 7, Maréchal Niel; 8, Mrs. Edward Mawley; 9, Muriel Grahame; 10, Souvenir d'Elise Vardon; 11, The Bride; 12, White Maman Cochet.

Their second twelve is as follows:—1, Anna Olivier; 2, Ethel Brownlow; 3, Golden Gate; 4, Hon. Edith Gifford; 5, Madame Cusin; 6, Madame de Watteville; 7, Madame Hoste; 8, Marie Van Houtte; 9, Medea; 10, Souvenir de S. A. Prince, better known here as the Queen; 11, Souvenir d'un Ami; 12, Sylph.

These are all good roses, and, no doubt, the best in the British climate. For us it will need revision. The first twelve contain the names of three roses which do not suit Queensland.

Cleopatra is always classed as poor in growth and difficult to manage. In skilful hands it yields phenomenal blooms. It is useless in Queensland, and so is Innocente Pirola.

Comtesse de Nadaillac stands in the front rank of varieties gaining distinction in the home shows as champion bloom. It is there a flower of surpassing beauty; with us, it is a poor grower and shy bloomer, little grown, and very seldom shown.

Of the second twelve, Marie Van Houtte, Medea, and Madame de Watteville are among our best. Madame Hoste and Golden Gate deserve to be more grown than they are, but the rest are very moderate in growth and not to be strongly recommended.

Strange to say, Niphetos, Souvenir de Thérèse Levet, and Perle des Jardins do not find a place.

The following is the selection I would recommend, for the neighbourhood of Brisbane at least:—

For Exhibition (twelve best): 1, Maman Cochet; 2, White Maman Cochet; 3, C. Niphetos; 4, Souvenir de Thérèse Levet; 5, Maréchal Niel; 6, Souvenir d'Elise Vardon; 7, Marie Van Houtte; 8, Perle des Jardins; 9, Medea; 10, Mrs. Edward Mawley; 11, Muriel Grahame; 12, Madame de Watteville.

(Second twelve): 1, The Bride; 2, Catherine Mermet; 3, Ernest Metz; 4, Lord Tarquin; 5, Empress Alexandra of Russia; 6, Mdlle. Francesca Kruger; 7, Madame Hippolyte Jamain; 8, Sylph; 9, Madame Hoste; 10, Madame Elie Lambert; 11, Souvenir de S. A. Prince or the Queen; 12, Madame Camille.

The following are also roses with many claims for recommendation:—Archduchesse Marie Immaculata Bridesmaid, Ceres, Christine de Noue, Devoniensis, Edouard Littaye, Golden Gate, Hon. Edith Gifford, Madame Georges Bouland, Madame Georges Dierrschmitt, Madame Lombard, Madame Welche, Sunset.

1. *Maman Cochet* (Cochet, 1892) is undoubtedly, I think, the first all round rose we have. It is very strange that for a few years its excellence was not fully acknowledged. A very vigorous and healthy grower, and splendid bloomer. Its faults are due to exuberance of growth; a tendency to coarseness and malformation, sometimes splitting even down through the calyx. No rose will, however, give anything like the number of real good blooms as this, and if it sometimes sins in the way indicated it surely has a right to be forgiven.

2. *White Maman Cochet* was first secured as a sport by Cook in the United States. Simultaneously with its reaching us from thence, one of our members secured a similar sport here. It is impossible to distinguish between them, and I think it is probable there are far more plants of the local than of the imported stock grown here, and quite rightly too. In a sport it often happens there are points of divergence from the parent. I do not think the White Maman is quite as vigorous as the pink. The foliage is on a smaller scale; the plant is of a more branching habit, and it is not quite so free in bloom. It is not pure white, but a creamy white, and the outer petals are tinted pink.

3. *Climbing Niphetos.*—Here we have almost a pure white. Occasionally the outer petals are tinged pink. It is a flower which anyone pretending to grow roses cannot be without. It is uncertain in growth, and can never be relied on to climb well until tested. The dwarf variety is a poor grower. As a bud we have nothing to surpass it, and when well-grown it yields wonderful flowers, as our show tables prove. Once growing well it should be kept liberally fed. Once a certain point is reached it opens out quickly and the beauty of form passes away.

4. *Souvenir de Thérèse Levet.*—It may be difficult to justify the position of fourth for this variety, but I place it here more on account of its colour. Dark reds are very scarce in tea roses, and we have no other dark-red tea of much value except François Dubreuil. Thérèse Levet is wanting in size, but Dubreuil more so. The former is good in growth and free in bloom, while, if generously treated, the size will come up. I remember at one of our shows a Thérèse Levet almost won the distinction of champion bloom, and general opinion did not go with the judge, who awarded it elsewhere. Beauty of form is always a strong point with this rose.

5. *Maréchal Niel.*—This is a grand rose, which in a great measure stands by itself, for it is pre-eminently a distinct flower. It has no doubt more Noisette than tea blood. I think we must agree that it is the best of all the yellows—grand in petal centre, shape, colour, fragrance, lasting qualities, and size. Many of our roses lose colour when cut, but Niel deepens in colour and is better on the second day if kept in water, especially in the dark. It is apt to become divided and to burn in the sun. It is slow in rooting and poor in growth at first, and when it gets unhealthy in wood it is best to root it up and replace. I came across rather a curious mistake in a somewhat ambitious print the other day. The rose was there stated to have been named in honour of Marshal Ney, "the bravest of the brave," one of the first Napoleon's most famous men, instead of which it is named from a far less famous man—Niel, one of the marshals of the second French Empire. It is generally understood that the Empress Eugenie bestowed the name. We have a so-called white Maréchal Niel, but it is a cream flower, not white, and though good not good enough to make a fuss about. The red Maréchal Niel is a miserable thing that will not grow for anybody.

6. *Souvenir d'Elise Vardon.*—The preceding five roses may be placed on the first rank for all purposes—exhibition, garden, and decoration. This is the first which we can recommend for one purpose only—viz., show. It is only moderate in growth, constitution, and blooming, but there generally come along a few good shoots, which produce blooms that to an enthusiast are better than a multitude of poorer ones. The petals are heavy and thick in texture, and the flower is of great lasting quality.

7. *Marie Van Houtte.*—A very good old rose which, because it is common, we do not value as we should. A splendid flower for the garden and for decoration, but I fancy the rose is falling behind in the estimation of exhibitors for no sufficient reason.

8. *Perle des Jardins* is somewhat on the small side, but the colour and form are generally good. It is a fair healthy grower, with reddish wood and fine foliage. The climbing variety is a great acquisition, and, for general purposes, I am almost inclined to prefer it to Maréchal Niel.

9. *Medea.*—This is a rose of much distinctiveness. The colour is pale, even cream, and we had it shown at our meetings in great excellence. It is not a vigorous grower, but does fairly well. I would not recommend it as a garden variety.

10. *Mrs. Edward Mawley.*—This is a new rose with, I believe, a good future before it as it becomes better known. With me, growth has been only moderate, and I would like to know how other members have succeeded with it.

11. *Muriel Grahame.*—This is one of the valuable Catherine Mermet family, which includes also The Bride and Waban. They are all exhibition varieties, and, with the exception of The Bride, not to be recommended for garden decoration.

12. *Madame de Watteville.*—A very distinct and unique rose in form and colouring. It is for this that I give it a place where I do. I think it is a rose that we should do better with. There is a plant of much more vigorous growth which greatly resembles it, called May Rivers, which is worth a better trial than it gets.

The second twelve:—

1. At the top, I place *The Bride*, and it certainly would be in the first twelve, but that White Maman Cochet has supplanted it. I am afraid very few of our rose-growers could distinguish the two flowers if handed to them together. I fancy the Bride is a trifle more refined in shape, but, when challenged with flowers of each, would probably fail in the contention. White Maman will yield 50 per cent. more flowers than the Bride, and this puts it to the front.

2. *Catherine Mermet* is another unfortunate, succeeded by a better grower, a better bloomer with more massive flowers in *Maman Cochet.*

3. *Ernest Metz.*—A show variety only, and cannot be recommended for anything else. When good it is a superb variety.

4. *Lord Tarquin.*—A good old rose of the cut-and-come-again class. Frequently yields blooms of high show quality. A good and healthy grower.

5. *Empress Alexandra of Russia.*—A good variety, healthy in growth, and giving blooms of a distinct colour. A dark crimson rose. They are of good quality, but nearly always hang with their heads downward, a bad habit in so good a rose. May be given a secondary place for garden decoration.

6. *Mdlle Francesca Kruger.*—Rather a small rose. If it were bigger it would go into the front rank. A vigorous grower and healthy. Profuse in bloom, and of excellent shape. Colour, a tawny yellow with pink lacing, and with some people not a favourite for this reason. Very good in early spring and late in autumn, but burns in summer. We should have splendid flowers if we only shaded our plants, but this is possible only to a leisured class of growers, and these we do not possess.

7. *Madame Hippolyte Jamain.*—A good rose of the pendent class hiding its flowers from view. A good rose for table decoration.

8. *Sylph.*—We have so many roses of the same pink and creamy colour that it is difficult to choose between them. Sylph is vigorous in growth and free in bloom.

9. *Madame Hoste.*—This is rather an old rose, but one that has not favour among us as it deserves. It is good for garden decoration, but I think requires thinning and shading to be at its best for exhibition.

10. *Madame Elie Lambert.*—We have two varieties among us of this rose. One is a satiny white which seldom opens well, the other, a much more vigorous plant, free in bloom; the flowers being cream and pink, somewhat like Sylph in appearance. This, I believe, should have another name, but it is the rose I mean here.

11. *The Queen or Souvenir de S.A. Prince.*—A sport from Souvenir d'un Ami. It is valuable as being about the purest white rose. Sometimes comes well, but is rather uncertain.

12. *Madame Camille.*—This is a big fine rose, and had it any other colour than the dirty pink it possesses, we should value it highly.

A number of our friends will ask why I have not included certain roses in these lists, such as Mrs. James Wilson, White Perle, Madame Caro (synonym Etoile de Lyon), Perle de Lyon, Louis Lévèque, &c.

Some of these are so much like better roses that it is not worth while multiplying varieties a little their inferior. Madame Caro is very liable to mildew and is such an arch deceiver that to grow the lady means to lose your temper. It is but seldom the flowers will open, and then they are so good that you are tempted to give the jade another chance and are taken in. Perle de Lyon has splendid colour, but is much liable to malformation, while Louis Lévèque, though pretty in the bud, like Jeanne Caband, opens generally into a big flower, disfigured by being divided into four quarters

For garden decoration I would recommend: Maman Cochet, Climbing Niphetos, Souvenir de Thérèse Levet, Mdlle. Francesca Kruger, White Maman Cochet, Marie van Houtte, Perle des Jardins (the climbing variety for preference if room enough), Madame Hippolyte Jamain, from the best of show varieties; and add the following:—Edouard Littaye, Wm. Allen Richardson, Sovenir de Rosieriste Rambeaux, Leo XIII., François Dubreuil.

For cutting in the budform: Climbing Niphetos, Martha du Bourg, François Dubreuil, Wm. Allen Richardson, Madame Bonnet Emyard, Homer, Souvenir de Catherine Guillot, Comtesse de la Barthe, Souvenir de Thérèse Levet, Comtesse de Frigneuse, Léonie Osterieth, Professor Ganiviat, the latter, however, has a strong tendency to mildew and also to bleach in colour.

It is a very difficult task to draw up a list of twelve best varieties. I have found it especially so with the twelve best for general garden purposes. The choice is from such a wide range that I have found it very hard to satisfy myself. With the twelve for this purpose, I am not altogether satisfied, having been compelled to omit standard sorts that have great claim to distinction. In the discussion to follow, I hope our rose-growing friends will stand up for their favourites—for those with which they have had most success; and, between us, we may come to some very useful conclusions.

PRODUCING RAIN BY ELECTRICITY.

An English journal says that some interesting experiments for the artificial production of rain by means of electricity have just been carried out in Japan. Waves of electricity directed skyward under a system somewhat similar to that upon which wireless telegraphy is based have resulted in atmospheric disturbances of far greater area than any ever artificially produced through the medium of detonating explosives in the upper air strata. The probability of achieving greater success in rainmaking through the means of electricity than by the use of explosives has been urged by scientists for several years. This attempt by the Japanese, however, is the first practical effort to prove the truth of the theory. It was attended by conspicuous success. Operations were commenced at 11 in the evening, but there was no sign of atmospheric change until 9 o'clock next morning, when a cluster of clouds was observed over the hill on which the experiment was held. At length rain began to fall, followed by a second fall at 11 a.m., and afterwards a third, fourth, and fifth, the last being about 9·30 in the evening. The area upon which the rain fell extended over many miles.

Tropical Industries.

CULTIVATION OF GINGER.

The *Journal d'Agriculture Tropicale* for July, 1902, contains an article on ginger, portions of which we translate in the interests of those who are growing that spice in Queensland:—

"Jamaica is the true home of ginger. In 1897 there were exported from that island 666,600 kilogrammes (1,466,520 lb.), valued at 1,332,200 francs (£55,550). This quantity was produced by 25,000 growers.

"The plant demands much hand labour, and also plenty of sunlight, a virgin soil, and moisture. Ginger must be planted in countries where the sun is seldom obscured by clouds. As to rainfall, a maximum annual fall of 72 inches is sufficient. The Barbados have shown that a calcareous soil, cultivated for the past 200 years, is suitable if properly manured. The land must be thoroughly worked and carefully cleared of weeds before planting. This must not be neglected, because during the growing season, if the weeds are torn out and the soil disturbed, the moisture may reach the rhizomes and cause them to rot.

"When the land is planted, it is covered with dry banana leaves and with stable manure, but artificial manure must be added, as the stable manure has little effect."

Here the *Journal* says that "unfortunately we do not as yet know of manures suitable for ginger." We (*Queensland Agricultural Journal*) would point out that if ginger is planted in a deep, sandy, peaty soil, never suffering from drought, yet free from standing water, only phosphoric acid and potash will be required. The quantity per acre is 500 lb. of a fertiliser containing—

Available phosphoric acid	10 per cent.
Potash	11 ,,

"In dry countries, where drought lasts for a considerable time, irrigation is indispensable, and where heavy rains are the rule drainage must be carefully carried out, because humidity and stagnant water are inimical to the plant, the rhizomes of which acquire, in consequence a disagreeable odour called 'black rot.' This disease is also attributable to the attacks of worms, and possibly in this case cryptograms occur, which have not as yet been fully studied.

"Commercial ginger is the dried rhizome of the plant, which rhizome must not be confounded with the root. It is a true subterranean branch, bearing minute leaves in the form of little scales. The true roots are very small, with no ramifications, and which die as the rhizome develops and runs underground. They are also seen on the subterranean stolons.

"The most valuable form of the rhizome is that which takes the shape of a hand with the fingers extended rectilinearly, and this shape it is sought to obtain in the cultivation. It arises from the fact that the branch springing from the eye of the nodule planted forms lateral pairs of branches alternately from each side. They are raised more easily if the soil has been well worked and well prepared before planted, provided that vigorous plants have been selected. When the stalks bleach which occurs in January and February, then is the time to gather the rhizomes. If the period of maturity is allowed to pass, the rhizomes will send up aerial stalks and will become fibrous, but before this, for several months they remain succulent, and may be used for making preserved ginger.

"The stool is raised by a single stroke of a hoe. As all bruises or breaks detract from its commercial value, the stool should be lifted in a mass. This operation requires almost a talent and a long apprenticeship. When extracted from the soil, the rhizomes are placed in a heap, having been previously

cleared of soil and other adherent substances. The fibrous parts are also removed. This work must be done immediately after the rhizomes are dry, for any delay will admit of the rhizome drying with these foreign substances adhering, and they will never become white.

"On the other hand, if they were allowed to remain in the heaps without desiccation, they would be immediately attacked by mould. Hence, as soon as they are cleaned, they are thrown into water, then they are ready for the operations of peeling and scraping, which are done by hand before drying.

"Peeling ginger demands much adroitness. It is done with a knife with a narrow, sharp blade When there is much to be done, the smartest peelers peel only between the fingers, leaving the rest of the work to the less adroit hands. The importance of this operation will be understood when it is remembered that the cells filled with essential oil are immediately beneath the epidermis. The cells are most numerous in the neighbourhood of the eyes. Hence, ginger must be peeled very delicately, but it must be peeled to allow of quick drying.

"As soon as the rhizomes are peeled they are thrown into clear water. The purer the water, and the more often renewed, the whiter will be the product. Water, therefore, must not be stinted. The "hands" peeled during the day remain for the night in the water. This water becomes glutinous, and if it is concentrated, it becomes syrupy, with a hot, aromatic flavour. Some planters use citron juice to whiten the ginger still more. Citric acid certainly acts on the colouring matter; but it has the objection of inducing mould owing to the sugar and pecton which it contains. It is therefore better to use citric acid pure, or more simply, vinegar.

"Another process is that of the use of boiling water. This is scarcely used in Jamaica. It is undoubtedly true that if ginger, before being scraped is thrown into boiling water, the epidermis is easily removed; but the starch and gum swell, and after boiling for an hour, the rhizome is much enlarged, and the steam of the water has carried off a portion of the essential oil. If the boiling be continued, the starch and gum disappear, the rhizome hardens, and becomes black. The product in this form is known as black ginger.

"Well treated ginger is white, and the well known Jamaica ginger is white. It occasionally happens that the colour has not been properly obtained; then the rhizome is painted with Spanish white. In other cases bleaching is done by means of sulphuric acid and chloride of lime; but these methods are not to be recommended.

"After washing comes the drying. This is done in the sun. When large quantities are to be operated on, they are dried on a 'barbecue,' a cemented area slightly convex, and placed in such a position as to receive the maximum rays of the sun.

"Small planters use a gridiron made of billets of wood laid parallel to each other, and on which is placed a bed of banana or palm leaves. Often they may lay palm leaves on the bare soil. The more careful growers turn their ginger at noon, and once again in the evening.

"Ginger takes from six to eight days to dry. It loses about from 70 per cent. of its weight by drying. If the sky is cloudy, or should rain come on, the ginger is covered with mould, which deteriorates its value. Ginger well dried in the sun, and fit for sale, still contains 7 to 12 per cent. of water, which it parts with in a drying chamber heated to 100 degrees Fahr.; but when it is badly dried there may be 25 per cent. of water in it. Drying is not always possible, and in some rainy years the whole crop has been destroyed by mould.

"It has been attempted to dry ginger without peeling it If this could be done it would save much labour, but the product by this method is quite black, and the smell is far from that so valuable in ginger dried in the sun. The North American fruit-drying apparatus has also been tried. But whether it was because wood was used as fuel, or whether the temperature was too high, and the operation badly conducted, the product was black and without aroma, besides which it acquired the smell of smoke, and had a burnt taste.

"We will describe a totally different method of preparation adopted in China, which consists of rasping the ginger. A fine powder is thus obtained, which can be desiccated in a perfect manner, and which is used as a condiment by the Chinese.

"From what has been said, it results that the plan of curing adopted in Jamaica is the best, admitting as it does of the production of white ginger.

"Yellow ginger has the finest aroma, and is preferred to the blue. In any case, the young shoots, having a mild taste and possessing less aroma, are not much in demand.

"Essence of ginger is obtained by distilling the rhizomes with water; the steam of the water carries with it the essence which is afterwards collected. There are several qualities of commercial ginger. The best quality consists of the largest hands, of a light and uniform colour, showing no trace of mould.

"This class of ginger is very fragile, and easily breaks; but broken hands diminish the value. Buyers demand hands with full fingers, firm, and without wrinkles or spot.

"The first quality is subdivided into five kinds—small and wrinkled hands being the lowest. Another quality is black ginger; a third, flinty; and a fourth, the ginger produced from suckers. Each of those last three kinds is divided into two sub-qualities, and in the first are placed perfect hands. The product of the suckers is the cheapest, as it small, black, watery, and wanting in aroma.

"Ginger taken up green wrinkles very much in drying. It is less aromatic and less sharp to the taste than that which is gathered at maturity.

"Moulded ginger shows spots, and the mouldiness sets up a decomposition which affects the aroma.

"If imperfectly dried ginger is put into bags, it will be certain to contract a mouldy smell, which cannot afterwards be got rid of

"The trade in ginger is an important one. Since 1885 the export from the West Indies has more than doubled.

"It is difficult to ascertain the cost of production; but it would appear that the crop is not very remunerative. But it must be noted that ginger is everywhere cultivated by small planters, who make use of their families for the purpose. Large proprietors grow very little ginger, because the work demands much outlay, and its cultivation is not in their line.

"The yield per acre is from 1,000 to 1,500 lb., with a maximum of 2,000 lb."

CULTIVATION OF PEPPER.

The Pepper Plant (*Piper nigrum*) is a perennial creeper, which is cultivated in Mexico, Java, Sumatra, Honduras, Mauritius, Tahiti, and in Southern India. Although a tropical plant, it is much hardier than many other spices, such as cloves, nutmegs, &c., and will grow perfectly well and produce fruit in Queensland. The limit of its profitable culture was placed by Crawford at lat. 5 degrees S. to 12 degrees N. and long. 96 degrees to 115 degrees E., but so many purely tropical plants have been shown to have found a congenial home in this State, which it was supposed could not possibly be grown on a commercial scale in any other country than that in which they had been cultivated for many years, that it is not at all unreasonable to believe that the pepper vine, if properly treated, will prove a commercial success in Queensland. That the vine will grow luxuriantly here has long ago been proved. The most suitable part of the State for its cultivation is the Northern coast country, where the rainfall is heavy and certain, say, from 80 to 100 inches per annum.

The plant loves a deep, well-drained vegetable soil, but it will grow in any soil where water does not lie stagnant. Of course on poor sandy soils or on stiff clays heavy crops are not to be expected. The vines are propagated either from cuttings or from seed. The cuttings should be about 18 inches long. The ends of the vines make the best cuttings. As the plant is a climber, it

naturally wants support, and this is afforded either by a growing tree or by stout posts about 12 feet high and 8 inches in diameter. If live supports are used, they should consist of trees which have a bark to which the fibrous roots of the vine can attach themselves. The trees principally used are the jack fruit and some species of coral trees, especially the *Erythrina corallodendron.*

Method of Cultivation.

After clearing, the ground is marked out into squares by lines intersecting each other at every 6 feet, some prefer 7 feet. At the points of intersection, cuttings of the coral tree are planted (coral trees, by the way, are plentiful in our Queensland scrubs). As soon as these have rooted and have produced trees strong enough to act as supports, two or three cuttings of the vine from 18 inches to 2 feet long are planted near them. The growth of the tree will keep pace with the growth of the vine. The trees must not be allowed to grow higher than from 12 to 15 feet, which will be in the second year, as the coral trees are very quick growers. Then they must be topped. The branches also are lopped every year, very little more being left than the rough stem for the vine to cling to. The branches are lopped so as to give the stumps a fan form, and thus afford a better shade to the pepper plant.

If left to itself the vine will attain a height of 20 feet or more, but for harvesting purposes it is restrained to about 12 feet. The cuttings should be planted as far from the support as possible, and be entirely buried with the exception of 4 or 5 inches resting against it. Between the second and third year it begins to bloom. The following season the stem is uncoiled from its support, and is placed in a spiral form in a hole dug for the purpose close to its root, the top only being left above ground. Rooting afresh at every joint, it grows again with renewed vigour, and the ensuing season bears a full crop. By some, instead of the buried coil method called "letting down," the vines are cut down nearly close to the ground, and are then allowed to grow again for their first crop; but the former method, providing as it does so many additional roots with which to extract food from the soil, is obviously best calculated to impart vigour to the plant. It is not regarded as a good practice to allow the first flowers to fruit, and to take their produce before this "letting down" process has been carried into effect. From the fourth to about the eighth year the vines continue to yield an annually improving crop, after which their productiveness gradually declines until at a period of about four years later the amount of produce is no longer remunerative. The best cultivators provide against this tendency of the plant by having succession plantations or gardens. When the plant begins bearing, all suckers are removed, one or two stems only being allowed to grow; the strongest suckers are used to replace misses or weakly plants, and so give uniformity to the plantation, or are applied to the formation of new gardens. While the plants are young they are kept weeded, but the labour is reduced as the plants by sheltering the ground lessen the growth of weeds. Plantations vary in size from 500 to 3,000 vines; but, where the number is larger, dividing hedges are grown so as to create plots of 500 vines each. In dry weather the plants are industriously watered. Flowers, green bunches of fruit, and mature berries may be seen at one time on the same vine, and from the first appearance of flowers, about four months elapse before any of the fruit is sufficiently mature for gathering. Considerable judgment is required for determining this period. If left too long, the ripe berries fall, and if the bunches are gathered prematurely, the berries shrivel too much in drying, and are less marketable. Unripe berries after drying go to dusty fragments in handling.

In full vigour, a pepper plant is very prolific, and each bunch containing from 20 to 30 berries, a single vine will often produce from 6 to 7 lb. of pepper, but the general average is very much less, probably not more than ½-lb. per vine over a whole plantation. The crop is an uncertain one, depending much on the seasons, and the fruit ripens irregularly over a greater part of the year, but a plantation in full bearing gives two crops in the year.

Simmonds states that some planters always raise their plants from seed, and that the vines so raised are said to bear for fourteen years; also that the crops from the latter are heavier and the berries larger.

Method of Harvesting.

When the first berries ripen, which is evidenced by their turning red, the crop is gathered. In Java, Dr. Meyen states that the crop is sometimes so great that the leaves of the plants cannot be seen for the immense quantity of berries. The exact point, for commencing to gather, requires, for reasons given before, some judgment, and can only be determined by experience. It is, of course, desirable that the vines shall not be injured, and for this reason, as well as for the purpose of reaching the top branches, the best cultivators use light, triangular bamboo ladders, the operator collecting the fruit in a basket slung over his shoulder. The fruiting spikes or bunches are gathered whole and spread on mats in the sun to dry. As they dry the spikes are turned over and either rubbed through the hands or trodden on for the purpose of separating the berries. After this, they are sifted and winnowed to fit them for packing for market.

Good black pepper should be large-grained, not excessively wrinkled, and hard. It should contain no broken grains nor any which crumble on being rubbed. That it should be highly pungent and aromatic is a matter of course, and the failure of any one of these conditions evidences immaturity at the time of gathering, or careless preparation.

White pepper is the same seed from the same plant, but deprived of its external skin. This is done by steeping the seed in water till the skin is soft, when it is rubbed off. The pungency of the pepper is, however, reduced by the process, and its value as a condiment is lessened, the only advantage being that it is more easily ground. Some small quantity of the white pepper of commerce consists of the first and largest berries which have fallen and bleached on the ground, whence they are carefully gathered and set aside.

What is known in commerce as "long pepper," consists of the fruiting spikes of *Piper longum.* These, which resemble the fruit of the common rib-grass, are gathered before maturity, are dried without detaching the seeds, and are sent to market in that form. They are warm and pungent, but possess only a slight aromatic odour. Nicholls says the yield varies very much. It may be from ½-lb. to 7 lb. for each vine, and these plants give at 7 feet distances, from 443 lb. to over 6,000 lb. per acre. With good cultivation and a suitable soil, 4,000 lb. an acre ought to be obtained.

The latest price quoted for pepper wholesale is, for black, from 4¾d. to 5¼d. per lb., and for white, 8½d to 9½d. per lb. Long pepper from 52s. to 54s. per cwt.

Most of the above we have taken from Bernays' Cultural Industries of Queensland.

COST OF SUGAR PRODUCTION IN BARBADOS.

The following interesting information on the cost of producing 1 ton of sugar in Barbados will doubtless be read with interest by sugar planters and manufacturers in this State. On the 28th February last His Excellency the Governor of the islands received a deputation from the Agricultural Society and he showed that the loss on the present year's crop of sugar in Barbados would reach £48,000 after paying the mere cost of production, and that it would require a rise of 18 cents per 100 lb. of sugar on the then price of 1·20 dollars and 5 dollars to save the said loss. To arrive at this conclusion, he based his calculation on the figures given in the Royal Commissioner's report, which stated that the cost of producing 1 ton net of muscovado sugar was £8 12s. 2d. This statement has called forth the subjoined remarks from a correspondent of the *Barbados Agricultural Gazette*:—It is to be regretted that His Excellency was evidently unaware of the method by which this sum

was arrived at, and which method is explained in the Royal Commissioners' report, Appendix C, Part III. (210) D—Note I. This reads as follows:—

"As the produce of a muscovado plantation consists of two commodities viz., sugar and molasses—the method of finding a correct answer to the question 'what is the cost of producing 1 ton of sugar' is not very obvious. The following process, however, which was employed in arriving at the foregoing results, affords about the nearest approach to accuracy that seems possible under the circumstances: First, equate the molasses crop of any given year to sugar—that is to say, find the number of tons of sugar which was required to realise in that year the amount of money which was actually realised by the molasses crop; next, add the number so found to the actual number of tons of which the crop of sugar consists; then divide the total expenses of the plantation by the sum of those numbers, and the quotient will be the cost of producing 1 ton of sugar.

Let us now adopt this method and see how this year's crop works out.

Assuming that the sugar crop of the island will be 65,000 tons, we must add, say, 70 gallons of molasses per ton. This may seem a low average, but I have taken it inasmuch as a certain portion will be vacuum pan molasses, which is of very little value at the present moment.

	Dollars.
Now, 65,000 tons sugar at 70 gallons molasses will give 4,550,000 gallons at say 8 cents per gallon	364,000
To hold this molasses, say, 38,000 puncheons, at 4 dollars... ...	152,000
Total amount received for molasses crop	516,000
The net ton of sugar, 2,240 lb., at 1·20 dollars per 100 lb.	26·88
Amount obtained for hhd....	5·00
Total received per ton of sugar	31·88

This sum divided into the amount received for molasses crop will give an equivalent of 16,185 tons sugar at 1·20 dollars and 5 dollars, or, roughly speaking, 16,000 tons We thus have 81,000 tons sugar at £8 12s. 2d. cost of production, and not 65,000 tons. The 81,000 tons sugar at £8 12s. 2d. will cost to produce £697,275. The 81,000 tons at 31·88 dollars (or £6 12s. 10d.) will give £537,975 Therefore, loss on working expenses at 1·20 dollars and 5 dollars will be £159,300 as against £48,000 as stated. Sugar having fallen 20 cents per 100 lb. means an increased loss of 4·48 dollars or 18s. 8d. per ton net. This on 81,000 tons sugar gives an increased loss of £75,600, thus making a total deficit, unless prices improve, on the year's crop of £234,900. We may have reduced expenditure somewhat since 1895, and, supposing we knock off the 12s. 2d. per ton, we save the sum of £49,275. This leaves still a deficit on cost of production of £185,625. Five cents rise or fall on 100 lb. of sugar means in each ton net 1·12 dollars or 4s. 8d. A rise of 5 cents per 100 lb. in 81,000 tons gives £18,900.

By a "rule of three" sum it will be found that a rise of nearly 50 cents on 1·00 dollars and 5 dollars will be required to work off the deficit of £185,625. In other words, sugar would have to sell at 1·50 dollars and 5 dollars to make good to the cultivator the cost of production pure and simple, and I feel convinced that every practical man that has charge of any estate will acknowledge that these figures more nearly represent the average island cost of production than 1·38 dollars and 5·00 dollars. Some estates favourably situated may take less, but others in laborious or bad-yielding districts will certainly require more. Unless prices improve we shall, therefore, have to face a probable deficit of £185,000; and no one can wonder that the merchants, who are business men, hesitate to continue advancing to estates whether in Chancery or out of Chancery. It is to be hoped that the Imperial Government will see their way, by some tariff arrangement, to help us to pull through the interim till 30th September, 1903, the date of the proposed abolition of the bounties.

VANILLA PLANTING AND CULTIVATION.

The following memorandum has been issued from the Government House, Seychelles:—No vanilla plantation should be started in Seychelles with a capital of less than £1,000, seeing that it takes three years to bring in a crop. Land suitable for vanilla, cacao, coffee, and other tropical products cannot be secured for much under 300 rupees per acre, and even at this price it is not easily obtainable. The ordinary rate of interest in Seychelles is 12 per cent. per annum. The local currency is the rupee, the value of which may be taken as 1s. 4d. Under the old system (planting on bars, wires, &c.), from 1,900 to 1,300 vines were planted per acre. Vanilla is now planted on live trees, and the number of vines planted depends upon the number of trees existing on the land brought under cultivation. Cuttings of quick-growing shrubs are now often planted in vacant spots, and vines are grown thereon in the absence of trees and within three months of the planting of the cuttings. Vines are planted 6 inches long, and began to bear three years after planting, but will only come into full bearing in three years more. Vines are worth per 100 from 3 rupees to 5 rupees according to district. Wages: Men, 14 rupees to 16 rupees; and women, 8 rupees to 12 rupees a month, without rations. On hill estates labourers are not easy to get, and most of the Africans prefer working on the share system. A man can plant 350 cuttings or vines per day, and can keep in good order, throughout the year, 2,500 plants. Women are employed for marrying the flowers—*i.e.*, removing the pollen from the anther of the flower and applying it to the stigma (fertilisation), without which operation the flower is lost. A woman can marry from 600 to 800 flowers per day. No flowers can be married after midday. Each vine can produce from 25 to 30 pods of different sizes, from 4 inches to 8 inches long. On an average 130 green pods go to 1 lb. of dry prepared vanilla. Pods shrink considerably in preparation, losing a quarter of their weight. Local prices: Last year (1901) fine pods prepared fetched 6 rupees to 10 rupees per lb. Green pods are now being sold at 3 rupees to 5 rupees per 100 pods. The regular flowering season is from August to December. The cost of preparation varies from 1 rupee to 1·25 rupees per lb. The pods are gathered about nine months after the flowers have been married, and curing the pods takes from three to four months. In Seychelles, as elsewhere, there are bad seasons (too much rain), in which case the yield is poor. The climate of Seychelles is very healthy. The population on the 31st May, 1901, was 19,257. The death rate in 1901 was 18·77 per 1,000. The Seychelles are in direct steam communication with Aden and Mauritius by a monthly service of steamers of the Messageries Maritimes Company, and with Colombo and Mombassa by a bi-monthly service of steamers of the Imperial German East Africa Company. Steamers belonging to the British India Company call, from time to time, at Seychelles. The Eastern Telegraph Company has a station at Victoria.

The rainfall in 1901 in Victoria was 101·83 inches. The maximum shade temperature registered was 88·5, and the minimum 68·4; the mean for the year being 78·50.—*Tropical Agriculturist*, Ceylon.

CARDAMOM CULTIVATION IN COORG.

A correspondent of the *Tropical Agriculturist*, Ceylon, writes to the *Madras Mail*:—The familiar cardamom of commerce is the produce of a plant which is botanically known as *Elettaria cardamomum*, and is indigenous to the hilly parts of Cochin China, Travancore, Malabar, Coorg, Munjerabad, and Nugur. It grows abundantly, both wild and under cultivation, in the moist shady mountain forests of North Canara, Coorg, and Wynaad, at an elevation of from 2,580 to 5,000 feet above sea-level. It is found truly wild in Canara, and in the Anamali, Cochin, and Travancore forests. On the lower range of the Pulney Hills, near Dindigul, at an elevation of 5,000 feet above the sea, it is systematically cultivated in the shade. There is also a small Cardamom Island in the Laccadive group of atolls. The plant grows as a spontaneous seedling in woods of high land, the cultivation consisting merely of clearing the

ground from trees. Fructification occurs in the fourth year as a rule, after which the plant produces fruit for five or six years. A rich moist soil in a bracing hill climate, within reach of sea breezes and favoured by deep shade and partial sunshine, is most congenial to the plant, while it attains perfection in a light layer of vegetable mould, resting on decayed primary rock. In the vicinity of streams and in localities subject to mists and fogs it also thrives remarkably well.

Its cultivation by the natives of Coorg presents several interesting features. The people firmly believe that the plant will only grow in places where the ground has been shaken and opened up by the fall of large trees. In February or March, the cultivators proceed to the forest and map out the boundaries of gardens. Having selected some large trees for felling, all the undergrowth near them is promptly cleared away. A platform is erected near the foot of the tree selected to be cut down. All this has to be accomplished in a day. The following morning the felling begins, and is completed by noon—for to prolong the work further is considered unlucky. Several gardens are thus prepared, with spaces of jungle between each of them. Within three months of the felling, or during the first monsoon rains, the young plants shoot up on all sides, chiefly round the stems of the fallen trees. By the second year they are 2 feet high. Now regular weeding operations are carried out. Each plant is allowed 6 feet of clear ground around it, the weaklings being removed. Early in the third year long shoots bearing the cardamom pods shoot forth from the ground. They are marked with beautiful pale white solitary flowers. The fruit is an ovate triangular three-celled three-valved capsule of a dirty yellow colour, enclosing numerous angular seeds, which form the valuable part of the plant, and which, if bruised, yield a pungent aromatic taste.

By September or October of the third year, the capsules ripen, and the first crop is gathered, a portion of it being offered to the deity. The next year a full harvest is collected, and then the plants go on yielding for about six or seven years. After this, they begin to weaken down, when large trees are again felled so as to fall across the sickly plants. Young plants then spring up, while fresh stems shoot out from the roots of the old ones, and the newcomers bear fruit in due course, dying down after five or six years, to be again succeeded by another generation produced by the process above described. The hill cultivators have their own superstitious notions, of course; but it is not difficult to explain rationally the good effects of the process of felling. The removal of the large trees admits a certain amount of sunlight; their heavy fall loosens the soil and opens it up to the action of the air. The cutting down of the undergrowth, which decays and dies where it drops, helps to fertilise the soil and to prevent its nutritive properties from being exhausted. The crushing of the plants at intervals of six or seven years by means of further felling merely serves to give them much-needed rest, after which they come up again, rejuvenated and vigorous.

Harvesting operations begin in September or October, and they present a really picturesque scene, though it is undoubtedly hard work for the harvesters, who have to put up with many discomforts and be prepared any moment for unpropitious showers of rain. They build little huts in the jungle, and in the centre of the floor a large pit is dug, about 3 feet deep, that will hold about eight or ten maunds of cardamoms. The sides of the pits are covered with leaves, and a circle of stones is arranged round the top to prevent dirt from falling in. At early dawn one group of harvesters sets out to clear the gardens of weeds and undergrowth, and a little later a second group follows. These pluck the clusters of cardamoms by hand, breaking off the racemes very close to the stems and dropping them into baskets made of leaves. At sunset all return, bearing their precious loads. At night, after a simple meal, the capsules are picked from the branches and thrown into the pit—a task which is sometimes carried on late into the night. After a little sleep the men rise betimes and proceed to the gardens, and the whole programme is repeated until the harvest has been fully collected.

Meanwhile, the women come from the villages to the huts, and, measuring the cardamoms into bags, carry them to the drying ground. They are best dried

by exposure to the sun, being spread out for the purpose on large mats, and taken in at night. Four days' good sun dries them properly, but too much exposure would result in the bursting of the capsules. After being dried, they assume a yellowish white colour. If rains comes down, the drying is effected by means of the smoke of wood fires, but by this process the cardamoms turn a darkish colour, which reduces their value. The last process, before the dried capsules are packed in close baskets and made ready for market, consists in removing the fruit stalks and all impurities. Precautions are also taken to keep dry and green capsules apart; besides which, different qualities of capsules are carefully separated, those having the largest number of fruit-bearing racemes on one stem fetching the best price and being technically known as "full crop."

The Coorgs have several superstitions regarding the cultivation of cardamoms. The felling of the big trees must be completed by noon, for it is deemed unlucky to fell in the afternoon. Tuesday and Friday are considered very auspicious days for beginning cultivation, whereas Sunday is always avoided as unlucky. The presence of certain plants, such as ebony, dammer, wild nutmeg, and wild pepper, near the felled trees is looked upon as a sure sign that the site cleared for new gardens is favourable for a rich crop. To ascertain this, a few big trees are sometimes felled one year and the following year, the presence or absence of the lucky trees just named is looked for, and only if they are found is the site used for a garden.

Cardamoms serve a great variety of purposes, and possess, therefore, considerable commercial value. In commerce, several varieties are distinguished according to their size and flavour. The most esteemed are known as "shorts," being from a quarter to half-an-inch long and about a-quarter broad. Following those come "short longs" and "long longs," also distinguished by their size, the largest reaching about an inch in length. The "shorts" are more coarsely ribbed and of a brown colour. They are commercially called Malabar cardamoms or Wynaad cardamoms, and reckoned the best of the tree. The "long longs" are more finely ribbed and of a paler colour, the seeds being white and shrivelled. The "short longs" differ from the latter only in being shorter or less pointed. Large cardamoms, distinct from these, are furnished by a different species of *amomum*.

In Travancore, where the cardamom grows spontaneously in the hills, in the deep shade of the forest, the cultivation has hitherto been almost entirely in native hands. The cultivators early in the season go up from the low country, cut the brushwood, burn the creepers, and otherwise clear the soil for the growth of the plants as soon as the rains fall. The rainy months are terribly malarious, so the cultivators hurry back to return at crop time. Till a few years ago, cardamoms were State monopoly, but this system has been almost totally abolished and a system of land tax introduced instead, with considerable profit to the Sirkar. In Coorg and Wynaad, also, the industry is almost entirely in native hands, though the cultivators can always obtain remunerative prices from planters and European merchants. On the Anger Kandy Settlement, near Tellichery, there are fine gardens, which yield very satisfactory returns.

The cardamom is not very largely used in English cookery, but in Northern Europe it is extensively consumed, being much in requisition for flavouring pastry. In India it is greatly prized, and is an article of almost daily use, being substituted for tobacco as well as for betel and pan, as well as partaken of in conjunction with these articles. The capsules are used by natives in flavouring sweetmeats and certain cooked dishes, while, when tender, they are pickled. The use of the spice, both as a medicine and a luxury, has gone up steadily, so that cardamom cultivation, systematically conducted, would be a suitable industry, especially for native capitalists and planters. The cost of cultivation does not amount to much, while by the adoption of improved methods, such as timely transplantation, trenching, manuring, and irrigation, quantity and quality of crop could both be substantially improved. The plant easily repays care bestowed upon it, almost the only necessary conditions being that it should be raised on congenial soil and harvested and cured with due regard to the needs of buyers and consumers.

Science.

MANGROVE BARK FOR TANNING.

Some time ago some samples of mangrove bark were received by the Department of Agriculture from Mr. W. T. Munro, Cairns, with a request that the value of the bark as a tanning material might be determined. The samples were submitted to Mr. J. C. Brünnich, Agricultural Chemist, who furnished the following analysis:—

		Per cent.
	Moisture	9·35
	Resinous gums, &c.	·75
	Ash (insoluble)	3·08
	Matters soluble in water	47·90
of which—		
	Tannic acid	39·50
	Pectin bodies, &c.	6·70
	Soluble ash	1·70

The analysis shows that the bark is of very good quality, containing a much higher percentage of tannic acid than either Tasmania or New Zealand wattle bark, and also less foreign inactive bodies. The former shows 29·60 per cent. and the latter 27·65 per cent. of tannic acid.

A report by Messrs. Ranfer, Ryl, Pratt, and Co., London, on mangrove bark from Cooktown stated that " by appearance, the bark is of good quality and worth about £5 per ton."

The following is the result of analyses made by Messrs. Lewis and Peat, 39 Lime street, London, E.C. :—

Extract.	By Boiling Water. A.	Soaking. B.
Tannin	36·00	28·80
Extraction and colouring matter	24·99	24·61
Insoluble matter	·50	1·95
Mineral	4·07	5·29
Water	34·44	39·35
	100·00	100·00

Both the extracts are readily soluble and may be acceptable for tanners' use, if the colour is approved.

CHEMICAL COMPOSITION OF THE BOTTLE-TREE.

(*Sterculia rupestris*, Benth.)

On account of the extreme scarcity of food for stock, resulting from the protracted drought in Queensland, the chemical section of the Department of Agriculture has extended its investigations to cover various vegetable growths, some of which are frequently looked upon as pests and nuisances.

The great stress put upon our agriculturists and pastoralists, in order to get sufficient fodder to keep their animals alive, has forced them to utilise at present many vegetable substances which in ordinary seasons would never be used. Among such vegetable growths, the pith of the trunks of bottle-trees is now extensively used as a fodder for cattle, and the object of this investigation has been to determine what feed value this substance actually possesses.

The following is the result of the analysis of a sample of a Bottle Tree (*Sterculia rupestris*, Benth.) obtained from a scrub near Biggenden. For the analysis the spongy pith of the tree was used :—

ANALYSIS OF PITH OF BOTTLE-TREE.

	Dry Substance Per cent.	Original Tree. Per cent.
Water	0·00	78·62
Nitrogen	0·650	0·139
Proteids (N × 6·0)	3·90	0·834
Starch	7·46	1·59
Fat (ether extract)	0·715	0·153
Ash (pure)	9·11	1·95
Soluble in Water.		
Total soluble extract	47·62	10·18
Soluble ash	6·52	1·39
Nitrogen	0·285	0·061
Soluble proteids (N × 6)	1·71	0·366
Carbohydrates, reducing Fehl. sol. { directly as fruit sug. ...	10·30	2·20
Carbohydrates, reducing Fehl. sol. { after inversion, do. ...	11·08	2·37
Vegetable mucilage (pectose) fr. diff.	28·31	6·05
Soluble in diluted Hydrochloric Acid (5 per cent.)		
Total extract	16·25	3·48
Ash	1·45	0·31
Carbohydrates as fruit sugar	3·87	0·83

Analysis of Crude Ash.

	Per cent.
Carbonic acid	23·91
Carbon...	0·41
Phosphoric acid	0·24
Lime	23·48
Magnesia	13·35
Potash	29·02
Soda	1·76

It is seen from a study of the above analysis that, in the first place, a very large proportion of the materials composing this pith or marc consists of substances actually soluble in water, as indicated by the high percentage of the water soluble extract. It is further seen that the materials contain, in not inconsiderable proportion, *proteids*, nitrogenous bodies which are the chief flesh and tissue forming constituents of all fodder plants.

Carbohydrates, or sugar-yielding bodies (starch, glucose, &c.), substances which produce and maintain the animal heat, are also found in very considerable amounts.

The special peculiarity in the composition, however, is the presence of a large amount of a substance known as *vegetable mucilage*, or pectose, a body which causes the watery extract of the pith to form a slimy jelly. The actual value of this substance as a food has not been thoroughly established; but the very fact of its being so easily soluble in water and the nature of its chemical composition make it probable that it is assimilated by the animal organism in similar manner as soluble carbohydrates.

The amount of ash found in the pith is also very high, and a special feature in the composition of this ash is presented by the high percentage of lime and potash and the very small amount of phosphoric acid. This low amount of phosphoric acid, found in the tree, would at once indicate that the bottle-tree is not a highly valuable food for cows in calf or for young growing stock, since phosphoric acid is the most important constituent of bones.

A comparison of the analysis of the bottle-tree with the analyses of other fodder plants indicates that, as a food, this material may be classed in its value with mangel-wurzel and cattle cabbage, but it is also found much superior to prickly pears.

It must be borne in mind, however, when studying the analyses of vegetable growths used as fodder under exceptional circumstances, that one does not look so much for an actual fattening value, but rather for indications as a food to keep the stock alive.

J. C. BRÜNNICH, Chemist.
W. MAXWELL, Director.

Department of Agriculture,
Chemical Section of Feed Stuffs and Products.

HOW THE PEA GIVES US NITROGEN.

The *Florida Agriculturist* takes the following from *Farmer and Fruit-grower* :—

It has long been known that plants belonging to what botanists call the family of Leguminosæ had in some way the power to acquire and use nitrogen that did not exist in a combined state in the soil. Some asserted that the plants absorbed the nitrogen from the air by means of their leaves. But later investigations have shown that the work of nitrogen-catching is done by the peas or clover or other legume (a legume is a plant the fruit of which is a legume or pod, hence the name for all the family is Leguminosæ or pod-bearers). The real work of getting the nitrogen, of which the air is largely composed in the form of a free gas, is done by certain microscopic plants that attach themselves to the roots of this class of plants as parasites. The parasitism, however, in this case is not a harmful one, since the little organisms that feed on the nitrogen gas that penetrates the soil give more to the roots than they take, and the process is a sort of symbiosis, or living together for mutual advantage, rather than a parasitism that is harmful. These little plants, consisting of single cells of living matter, have the wonderful power, that no green plant has, of feeding on the nitrogen gas, and, through this feeding or oxidation of the nitrogen, forming nitric acid.

Now when an acid is formed in the oil it at once finds some base, such as line, potash or magnesia, and is transformed into what is called a salt of these substances, and the result in this case is the formation of nitrates of potash, lime of magnesia, which green plants like the clover can at once absorb and use in their growth, for it has been proved that all forms of nitrogen in the soil must be changed into nitrate before the green-leaved plants can use it. In this process of the formation of nitrates by the little plants that exist on the roots of the pea, the pea is enabled to take up and store away in its growth a large part of the nitrates formed, and the soil also gets fixed in it the same form more than the pea takes up, and the nitrogen content of the soil itself is increased.

The Gain in Saving Hay.—Now, when the pea crop is harvested as hay, a large part of this nitrogen is taken in this hay. But in feeding the hay, by far the larger part is recovered in the droppings of the stock, and, if this is carefully saved and applied, we lose but a small part of the manurial value of the pea, while at the same time we can get the feeding value to make a profit out of in the stock. Another part remains in the roots in the form

of organic matter, and this part must go through the process of what is called nitrification in the soil before it becomes available for the growth of other plants that follow the pea. This keeps it in the soil until the following summer, when it rapidly becomes available for plants by changing into the available form of a nitrate.

This process of nitrification in a soil abounding in vegetable matter is brought about by other forms of microscopic plants that flourish in such a soil. Thus a soil abounding in organic matter in a state of decay can really be called a living soil, while one in which the humus or organic decay has been used out of is really a dead soil. As soon as the dead pea roots are left in the soil, the bacterium of decay sets to work to break down the organic matter, and to release the ammonia. Then another form of bacterium takes up the work and changes the ammonia into a nitrate; still another form then changes the nitrate into a nitrate which green plants can use. It has been found that the presence of the carbonate of lime in the soil rapidly hastens the nitrification, and it has further been found that these little organisms have another power that green plants do not possess, of taking from such a combination the carbon they need for their growth. Green-leaved plants get their carbon through the decomposition of the carbonic acid in the air, by means of the green matter in the leaves, but these little microscopic plants in the soil get it directly from the carbonate. This explains the way in which an excess of lime in a soil abounding in vegetable decay hastens the process of nitrification or change of organic matter into the available form of a nitrate for the use of the green plants.

Times of Sunrise and Sunset, 1902.

Date.	September.		October.		November.		December.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·30	5·32	5·44	5·2	6·2	4·50	6·24
2 ...	6·5	5·31	5·31	5·45	5·0	6·3	4·50	6·24
3 ...	6·4	5·32	5·29	5·45	4·59	6·5	4 51	6·25
4 ...	6·2	5·32	5·28	5·46	4·58	6·6	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·57	6·7	4·51	6·26
6 ...	6·1	5·33	5·26	5·47	4·57	6·7	4·51	6·28
7 ...	6·0	5·34	5·25	5·47	4·57	6·7	4·51	6·28
8 ...	5·59	5·35	5·24	5·48	4·56	6·8	4·50	6·30
9 ...	5·57	5·35	5·23	5·49	4·56	6·8	4·50	6·30
10 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·31
11 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·32
12 ...	5·54	5·36	5 21	5·49	4·55	6·9	4·50	6·32
13 ...	5·53	5·37	5·20	5·50	4·54	6·10	4·51	6 33
14 ...	5·51	5·37	5·19	5·50	4·54	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·54	6·12	4·52	6·34
16 ...	5·49	5·38	5·18	5·50	4·53	6·13	4·52	6·34
17 ...	5·48	5·38	5·17	5·51	4·52	6·14	4·53	6·35
18 ...	5·47	5·39	5·15	5·51	4·51	6·15	4·53	6·35
19 ...	5·45	5·39	5·15	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·49	6·17	4·54	6·37
21 ...	5·43	5·40	5·13	5·53	4·49	6·18	4·54	6·38
22 ...	5·42	5·40	5·12	5·54	4·49	6·18	4·54	6·38
23 ...	5·41	5·41	5·11	5·55	4·49	6·19	4·55	6·39
24 ...	5·39	5·41	5·9	5·55	4·49	6·19	4·55	6·39
25 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
26 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
27 ...	5·36	5·43	5·7	5·57	4·49	6·21	4·57	6·41
28 ...	5·35	5·43	5·6	5·58	4·49	6·22	4·57	6·41
29 ...	5·34	5·44	5·5	5·59	4·49	6·22	4·58	6·42
30 ...	5·32	5·44	5·4	6·0	4·49	6·23	4·59	6·42
31 ...	...	...	5·3	6·1	...	...	4·59	6·42

Phases of the Moon.

Date	Phase	H.	M.
1 Sept.	● New Moon	17	19·4
9 „	☽ First Quarter	10	14·9
17 „	○ Full Moon	6	23·4
24 „	☾ Last Quarter	4	31·5
1 Oct.	● New Moon	5	9·1
9 „	☽ First Quarter	5	21·1
16 „	○ Full Moon	18	1·1
23 „	☾ Last Quarter	10	58·1
30 „	● New Moon	20	13·6
8 Nov.	☽ First Quarter	0	30·5
15 „	○ Full Moon	5	6·5
21 „	☾ Last Quarter	19	46·9
29 „	● New Moon	14	4·4
7 Dec.	☽ First Quarter	18	26·5
14 „	○ Full Moon	15	47·4
21 „	☾ Last Quarter	8	0·2
29 „	● New Moon	9	24·8

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1901.				1902.								
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
North.													
Bowen	0·18	0·93	0·92	0·71	0·19	2·19	2·01	0·68	Nil.	0·44	0·11	0·02	Nil.
Cairns	1·82	2·34	5·23	2·78	3·79	12·90	11·43	3·48	2·34	4·97	3·87	0·95	Nil.
Geraldton	3·37	3·85	6·45	1·60	3·78	16·87	7·55	12·83	5·39	8·10	7·32	1·77	Nil.
Herberton	1·04	4·92	1·13	1·30	0·57	5·77	3·86	1·54	1·07	1·58	2·05	0·03	Nil.
Hughenden	Nil.	0·31	0·29	1·43	1·57	2·02	0·53	*	Nil.	Nil.	Nil.	Nil.	Nil.
Kamerunga	1·72	1·19	5·74	2·16	2·58	10 59	14·24	3·40	2·63	5·12	4·00	0·81	Nil.
Longreach	0·58	Nil.	Nil.	1·71	0·87	0·27	0·18	0·03	0·03	Nil.	Nil.	0·05	Nil.
Lucinda	0·30	2·59	Nil.	0·32	3·55	11·38	2·67	1·78	*	0·63	0·21	0·45	Nil.
Mackay	2·29	1·35	1·85	0·71	3·78	8·43	4·41	6·73	1·26	2·33	0·59	0·80	Nil.
Rockhampton	1·78	0·51	0·41	0·19	4·79	1·36	1·68	0·21	Nil.	Nil.	Nil.	0·09	1·41
Townsville	0·14	0·90	0·16	0·61	2·24	3·14	1·61	0·35	0·04	0·10	Nil.	0·10	Nil.
South.													
Barcaldine	0·51	0·54	0·55	0·09	2·39	0·07	0·37	0·02	Nil.	Nil.	Nil.	0·08	0·02
Beenleigh	0·70	3·35	1·35	0·14	2·41	1·82	0·68	0·42	Nil.	0·11	0·62	0·49	0·28
Biggenden	2·11	1·35	0·47	0·92	2·12	0·83	1·80	0·65	Nil.	0·04	0·08	0·04	1·58
Blackall	0·88	0·60	0·97	0·32	1·68	0·34	0·34	0·05	Nil.	0·01	0·01	0·21	0·27
Brisbane	1·30	3·25	1·41	0·75	1·38	2·67	0·76	0·17	0·47	0·06	0·55	0·98	1·30
Bundaberg	1·80	2·18	1·28	Nil.	6·33	0·75	1·99	0·43	0·02	Nil.	0·07	0·13	0·31
Caboolture	1·55	5·01	3·17	3·45	2·29	2·66	1·29	1·99	Nil.	0·03	0·20	0·05	1·09
Charleville	0·32	0·04	0·65	0·96	0·47	0·22	0·42	0·23	Nil.	0·12	Nil.	1·04	0·30
Dalby	1·11	4·09	0·15	0·42	1·65	0·20	0·30	2·00	Nil.	0·15	Nil.	0·41	0·70
Emerald	1·11	Nil.	0·09	0·63	3·28	1·11	0·97	0·30	Nil.	0·01	Nil.	Nil.	0·02
Esk	1·72	4·87	1·08	2·20	1·81	1·06	0·75	1·25	Nil.	0·04	0·25	0·15	0·64
Gatton College ...	1·06	3·02	0·86	0·26	2·27	1·58	0·26	*	0·04	0·03	0·04	0·64	0·73
Gayndah	1·91	2·39	0·04	0·38	2·54	0·51	0·99	0·81	0·29	Nil.	Nil.	0·05	0·64
Gindie	1·81	0·53	0·02	0·57	1·35	1·46	0·78	0·47	Nil.	Nil.	Nil.	Nil.	0·10
Goondiwindi	0·67	2·83	0·21	0·20	2·06	0·75	1·20	0·06	0·02	0·41	Nil.	1·19	0·21
Gympie	1·34	1·91	1·34	1·25	1·49	1·65	2·33	1·09	0·23	Nil.	0·36	0·94	1·38
Ipswich	3·54	3·98	1·17	0·35	1·45	2·80	0·32	0·03	0·02	0·15	0·31	0·77	0·30
Laidley	1·22	3·37	1·10	1·65	1·79	1·94	0·39	0·10	0·20	0·06	Nil.	0·40	0·89
Maryborough	1·05	1·54	1·84	1·54	1·29	0·75	0·96	1·57	0·36	0·24	0·29	0 57	0·69
Nambour	0·98	3·89	2·85	3·89	1·30	2·06	1·61	†	0·26	0·04	*	0·70	0·35
Nerang	0·88	4·57	2·70	0·46	3·98	4·54	0·65	0·65	0·35	0·52	1·07	1·22	1·17
Roma	0·43	0·71	0·54	0·83	2·72	1·11	0·54	0·15	Nil.	0·20	Nil.	0·46	0·35
Stanthorpe	1·42	2·93	2·22	1·67	3·17	0·51	0·56	0·10	0·87	0·78	0·15	0·94	0·95
Tambo	1·47	0·51	Nil.	0·16	1·73	0·35	0·68	0·04	Nil.	0·01	Nil.	0·28	0·06
Taroom	2·11	0·92	0·42	0·31	0·53	1·82	1·30	0·33	Nil.	Nil.	Nil.	0·17	0·45
Tewantin	2·71	3·26	1·66	2·70	3·09	1·13	3·44	2·84	0·80	0·91	0·91	0·85	0·87
Texas	1·47	1·47	0·26	0·43	1·95	1·62	0·42	Nil.	Nil.	0·88	Nil.	1·57	0·13
Toowoomba	1·85	4·45	1·10	0·87	3·46	1·20	Nil.	0·79	0·03	0·38	0·19	0·56	0·37
Warwick	2·05	3·12	1·19	0·71	3·48	0·65	0·55	Nil.	0·15	0·63	0·20	0·94	0·43
Westbrook	1·75	2·27	0·59	0·31	3·21	1·04	0·06	0·41	Nil.	0·28	0·06	0·29	0·38

* Returns not yet received. † Data unreliable.

CLEMENT L. WRAGGE,
Wragge's Weather Bureau.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Choicest salt Canadian, 98s. for salt to 102s. to 108s. for saltless; finest, 94s. to 96s. Danish, choicest, 106s. to 108s.; finest, 102s. to 104s. No quotations for Australian and New Zealand.

CHEESE (duty free).—American, 47s. to 48s.; Canadian, 48s. to 49s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d.; refined, 4s. 2d. and ¼ per cent.).—Refined, £13 9s. to £15 per ton; raw, £10 to £14 per ton. German beet, 88 per cent., 6s. per cwt.

SYRUPS (duty, 2s. per cwt. and ¼ per cent.).—Finest, 14s. to 17s. 6d. per cwt.

MOLASSES (duty, 2s. per cwt. and ¼ per cent.).—5s. 9d. to 6s. 6d. per cwt.

RICE (duty 3d. per cwt.).—Rangoon, £5 10s. 6d. to £6 5s.; Japan, £12 to £17; Java, £18 to £24; Patna, £17 to £21.

COFFEE (in bond, duty 1½d. per lb. and ¼ per cent.).—Ceylon plantation, small to good middling, 45s. to 100s.; peaberry, 74s. to 120s.; Santos, 28s. to 58s.; Mocha, 60s. to 80s.; Jamaica, finest, 96s. to 120s. per cwt.

ARROWROOT.—St. Vincent, 2d. to 5d.; Natal, 5d. to 8d.; Bermuda, 1s. 3d. to 1s. 6d. per lb.

WHEAT.—Australian, white, 31s. 6d. to 32s.; New Zealand, white, no quotation; Duluth, red, 31s. 6d.; Manitoba, red, 32s. to 33s. 6d. per 480 lb.

FLOUR.—Australian, 24s. 6d. per 280 lb.

MALTING BARLEY.—English, 28s. per 448 lb.

OATS.—New Zealand, 26s. 6d. to 28s. per 384 lb.; Canadian, 28s. 6d. to 31s. per 320 lb.

SPLIT PEAS.—47s. 6d. per 504 lb.

GINGER.—Japan, 33s. to 34s.; Jamaica, 56s. to 63s.; low and common, 35s. to 49s. per cwt.

PEPPER.—Black, 5½d. to 6d.; white, 10d. to 11½d.; capsicums, 16s. to 80s.; chillies, 34s. to 37s. per cwt.

TOBACCO.—American. Messrs. Thomas H. Edwards and Co., Liverpool, report as follows on the Tobacco Trade:—

STRIPS.	1902.	1901.
WESTERN—		
Fillers	— @ 5 @ —	4 @ —
Rather short	5¼ @ 6	5 ,, 6
Very middling to middling	6¼ ,, 6¾	6¼ ,, 7
Good to fine	7 @ 8 @ —	— @ 7¼ @ 8
BURLEY	6 ,, 8½ ,, —	5½ ,, 8 ,, 11
VIRGINIA DARK—		
Fillers ...	5¼ @ 5¾	4½ @ —
Rather short	6 ,, 6¼	5 ,, 5½
Very middling to middling	6½ ,, 7½	6½ ,, 7½
Good to fine	8 ,, —	8 @ 9 @ —
VIRGINIA and CAROLINA BRIGHT—		
Semi-dark	— ,, 8	— @ 5½
Semi-bright	8½ @ 9 @ —	5¾ @ 7 @ —
Medium or mixed ...	10 @ 11	8 @ 9
Good to fine	11¼ @ 12½ @ 14	9½ @ 11½ @ 13

LEAF.	1902.	1901.
WESTERN—		
Common export ...	— @ —	— @ —
African export ...	— @ 5 @ 6½	— @ 5 @ 6½
Short trade ...	4 @ —	3¼ @ 4
Medium to good trade	4½ ,, 6	4½ ,, 6
BURLEY	7 @ 7½ @ 8	6 @ 7½ @ 8
VIRGINIA DARK—		
Common export ...	— @ —	None.
Short trade	— ,, —	3½ @ —
Medium trade ...	4 ,, 5	4 ,, 5
Good to fine trade ...	5½ ,, —	5½ ,, —
VIRGINIA and CAROLINA BRIGHT—		
Common or semi-bright	6 ,, 7½	4 ,, 6
Medium or mixed ...	8½ @ 10 @ —	6½ @ 8 @ —
Good to fine	11 ,, 12 ,, 15	9½ @ 11 @ 15

WINE.—Australian Burgundy: Wotonga, red, 13s.; Waratah, red, 18s., per dozen bottles. Quart flagons, per dozen, 17s. and 23s. respectively.

GREEN FRUIT.—Oranges, no quotation. Lemons, finest, 22s. to 26s. per case of 420. Bananas, 9s. to 14s. per bunch.

COTTON.—Market in a disturbed state. Quotation, 6d. per lb. for clean Uplands. Queensland farmers will do well to watch the cotton market.

COTTON SEED.—£7 12s. 6d. per ton.

COTTON-SEED OIL CAKE (decorticated).—£6 5s. to £6 12s. 6d. per ton.

COTTON-SEED OIL.—Crude, £21 12s. to £24 5s. per ton.

LINSEED.—52s. to 54s. 6d. per 416 lb.

LINSEED OIL.—£30 to £30 10s. per ton.

LINSEED OIL CAKE.—£7 11s. to £7 15s. per ton.

MANILLA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£33 10s. per ton.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meats, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Mutton.
(Crossbred Wethers and Maiden Ewes.)

	Oct. 11.	Oct. 18.
Canterbury, light (48 lb. to 56 lb.)	$4\frac{3}{8}$d.	$4\frac{3}{4}$d.
Canterbury, medium (56 lb. to 64 lb.)	$4\frac{1}{4}$d.	$4\frac{5}{8}$d.
Canterbury, heavy (64 lb. to 72 lb.)	$4\frac{1}{3}$d.	$4\frac{1}{2}$d.
Dunedin and Southland (56 lb. to 64 lb.)	None offering.	
North Island (55 lb. to 65 lb.) ...	$4\frac{1}{8}$d.	$4\frac{1}{2}$d.

Australian Sheep.
(Crossbred or Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{3}{4}$d.	None offering.
Light (under 50 lb.)	$3\frac{7}{8}$d.	4d.

River Plate Sheep.
(Crossbred or Merino Wethers.)

Heavy (over 50 lb.)	$3\frac{11}{16}$d.	$4\frac{3}{16}$d.
Light (under 50 lb.)	$3\frac{15}{16}$d.	$4\frac{3}{16}$d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	$5\frac{1}{2}$d.	$5\frac{3}{4}$d.
Canterbury, heavy (36 lb. to 42 lb.)	$5\frac{1}{2}$d.	$5\frac{3}{4}$d.
Dunedin and Southland (28 lb. to 42 lb.)	None offering.	
North Island (28 lb. to 42 lb.) ...	$5\frac{3}{8}$d.	$5\frac{1}{2}$d.

Australian Lambs.

30 lb. to 40 lb.	None offering.	

River Plate Lambs.

30 lb. to 40 lb.	None offering.	

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.
Ox, hinds (180 lb. to 220 lb.) ...	5d.	5d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ...	$3\frac{5}{8}$d.	$3\frac{5}{8}$d.
Ox, hinds (160 lb. to 200 lb.) ...	$4\frac{1}{8}$d.	$4\frac{1}{8}$d.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	$3\frac{15}{16}$d.	$1\frac{15}{16}$d.
Ox, hinds (160 lb. to 220 lb.) ...	$4\frac{7}{16}$	$4\frac{7}{16}$d.

These prices are the official quotations furnished by the Frozen Meat Trade Association. The basis of quotations is sales of lines of not less than 100 carcasses of mutton or lamb, or twenty-five quarters of beef. All the quotations for mutton are for average quality. Quotations of Australian and New Zealand lambs do not include sales of small lambs or heavies or inferior quality.

EGGS.—French, 9s. 3d. to 9s. 6d.; Danish, 8s. 6d. to 10s. per 120.

BACON.—Irish, 65s. to 68s.; American, 56s. to 60s.; Canadian, 65s. to 66s. per cwt.

HAMS.—Irish, 88s. to 102s.; American, 58s. to 63s. per cwt.

TALLOW.—Beef, fine, £33 10s.; medium, £30 10s.; mutton, fine, £38; medium, £33 10s. per ton.

Agricultural Patents.

PATENTS ACCEPTED.

Cattle Food and Manure from Yeast and Spent Hops.—Classes 33, 36, 82 (No Drawings)—6525: William Wardle, of 6 Scalpcliff road, Burton-on-Trent, Stafford, England, manager. "Improved Method of Preparing Yeast for Use in the Manufacture of Food or Manure." Dated 18th March, 1902. (Drawings, nil; specification, 4s. 6d.) In utilising brewers' surplus yeast and spent hops, this modification of the usual process consists in pulverising or grinding the dry sweet spent hops to a mash before mixing with as much yeast as they will absorb; the mixture is piled in heaps for four to five days, and is occasionally turned over until the fermentation ceases, after which it is quickly kiln-dried, and may be used as cattle food, either alone or in conjunction with other foods. The product may also be used as manure. (2 claims.)

Liquid Seals (afterwards solidified) for Cans.—Classes 32, 76 (14 Figures)—6529: Valves, Limited, of Suffolk House, Laurence Pountney Hill, London, England, manufacturers (assignees of John Radcliffe Croft, of 20 Mark lane, London, England, merchant). "Improvements in the Hermetic Sealing of Tins and like receptacles." Dated 21st March, 1902. (Drawings, 20s.; specification, 22s. 6d.) To prevent the admission of any small quantity of air (possibly not sterilized) during the sealing of the final closure of food cans, the finally closed hole is made at the bottom of a depression in which the molten solder (or wax) acts as a liquid seal, allowing expanding air from the interior to pass out, but preventing the ingress of external air. To prevent the liquid solder being forced inwards by the external pressure, a fusible solder (or wax) is selected that melts very near the temperature of closure, so that a very slight reduction of temperature solidifies the solder; and to the same end the hole is backed with a pad of filter-paper (or porous material) which prevents the solder being entirely forced inside before solidification. Many forms of the joint are illustrated in which the porous pad is placed between layers of sheet metal, stamped into convenient annular corrugations, with perforations or openings on ridges internal to the pad; in some cases an extra outer pad and perforated cover is added; in others the two plates with a pad between are separately formed and attached to the cover of the can by a less fusible solder. For retort cooking, the vent solder may fuse at about 240 degrees Fahr.; for water bath cooking, fusible metal smelting at 180 degrees to 212 degrees Fahr. is suitable; whilst for cold vacuum sealing, paraffin wax or the like may be used, and optionally a guard cover may be afterwards soldered above the wax seal, or a perforated guard may be attached before sealing. (6 claims.)

Water Bag Safe.—Class 34 (3 Figures)—6271: Walter Skelton, of the Broadway, Dunolly, Victoria, Australia, importer. "Improvements in a Combination Water Bag and Extension Cool Chamber or Chambers." Dated 14th October, 1901. (Drawings, 5s.; specification, 6s. 6d.) In water cooler bags combining storage chambers similar to specifications Nos. 5421 and 6356 in which a cylindrical or rectangular bag has horizontal partitions dividing the vertical length into compartments, one of which holds water and the other has a doorway and flap cover for the insertion of provisions, &c. Either the upper or lower compartment may be the safe, or there may be two partitions with water between and storage above and below. In Fig. 1 the lower compartment has a metal roof; in Fig. 2 the lower compartment holds the water and is filled through a side opening; and in Fig. 3 the jacket is double, so that the cooled water surrounds the safe except at the door. (3 claims.)

Dairy Cooler and Aerator; Exposed Films.—Classes 32, 34 (2 Figures)—6398: Peter Kenny, of Katamatite, Victoria, dairy inspector. "Improvements in Combined Milk and Cream Aerators and Coolers." Dated 24th December, 1901. (Drawings, 7s. 6d.; specification, 4s.) A milk pail is divided into upper and lower compartments by horizontal partitions; the lower part is filled to the partition with cooling fluid by a lateral spout; the milk runs from the top compartment through a row of perforations, impinges against a baffle ring, flows down the outside in a film, and is collected in a tray below; the tray has also a double bottom containing cooling fluid. (2 claims.)

Drying and Compressing Mixed Forage.—Classes 12, 36, 58 (8 Figures)—6521: Abinger Whittome, of Burnt House, and Cecil Whittome, of Arnsdorf, both in Whittlesea, county of Cambridge, England, merchant farmers. "Improvements in Preparing and Compressing Forage and the like and in Apparatus therefor." Dated 14th March, 1902. (Drawings, on application; specification, 6s. 6d.) The components of the forage are mixed by feeding in an elevator and by passage through in a rotating barrel-drier having internal and external steam jackets between which the fodder moves oppositely to the drying current of air; from this the fodder is lifted to a steam-heated table and thence fed by rake-belts to the pressing-boxes. The pressing-boxes have removable bottom-plates and upper removable latched sections to allow wrapping and hooping; canvases for partial wrapping are placed at top and bottom; the box is then wheeled over the press-platen, and the false bottom is removed; the bale may be hooped by half-hoops jointed at both sides; or the upper hoop may be full length and be passed through grooves in the press-platen, which grooves may be temporarily filled by reversed wedges or other removable devices. The ends of the bale may be covered by sewing extra canvas pieces if desired. (6 claims.)

Cane Trash Stripper.—Class 30 (13 Figures)—6195: William Innes, of Cairns, Queensland, carpenter. "Sugar-cane Trasher." Dated 5th September, 1901. (Drawings, 25s.; specification, 6s.) A two-wheeled horse-propelled frame is moved between the rows of standing cane, and is built of such width as to nearly fill the gap; at each side in front and rear of the wheels are nearly horizontal shafts driven from the axle by bevel gear with sliding clutches, so as to revolve in opposite directions; these shafts are provided with springy-wire teeth, those on the front shaft lift up the trash that may have fallen to the ground and the back set of teeth striking downwards tear off the lower leaves from the cane stalks; to prevent clogging there are combs fixed to bars in the frame whose teeth project between the teeth and rest on the shafts at their points. The whole machine is cased with an armour of latticed battens to prevent the trash falling inside the vehicle; the battened frames are continued forward on each side of the shafts, and are joined by a bar in front of the horse; the front part of this latticed screen is hinged to lift up whilst harnessing the horse. (4 claims.)

Tensionally-braced Wire Gate.—Class 35 (4 Figures)—6104: Edward Ernest Peterson, of Yorkie P.O., *viâ* Miva, Queensland, engine-driver. "An Improved Form of Wire Gate." Dated 11th July, 1901. (Drawings, 10s.; specification, 5s.) Vertical end styles are held apart by one or more central horizontal spreaders, and are tied together by horizontal and diagonal wires in tension; the main central vertical strut may also be trussed by lateral wires bowed outwards horizontally by a short strut. (2 claims.)

Vertically-moving Collapsing Wire Gate.—Class 35 (10 Figures)—6341: Samuel Smyth Coburn, of No. 38 Maningtree road, Hawthorn, Victoria, medical student. "An Improved Field Gate." Dated 25th November, 1901 (Drawings, 12s. 6d.; specification, 7s.) This gate swings vertically on a side pivot by the action of ropes that may be operated by an advancing or departing rider. The gate consists of a rigid top bar, a tension rod above, and

several parallel lower wires connected by droppers; the top bar has a horizontal pivot at the fixed end with an overhanging portion and a counterbalancing bob; the moving gate-end sets in a V-notch in the post and is locked by a detent or latch on the bar; the outermost dropper is a stronger bar and is extended above to the tie bar, which has a screw turn-buckle to stretch the lower wires between the outer dropper and the butt post, to which they have an elastic connection; the whole of the joints are flexible or pivoted so that as the gate rises all the rectangular meshes collapse into parallelograms. The balance bob is so arranged that when the gate is "up" the centre of gravity of the whole passes over slightly past the main pivot: the lifting ropes are led over guide pulleys to convenient posts, and the first traction loosens the detent or latch; the impetus of the pull carries the centre of gravity over the centres, and leaves the point of attachment (of the rope to the gate) also past the pivot line, so that a second pull will return the gate to its "down" or closed position. (5 claims.)

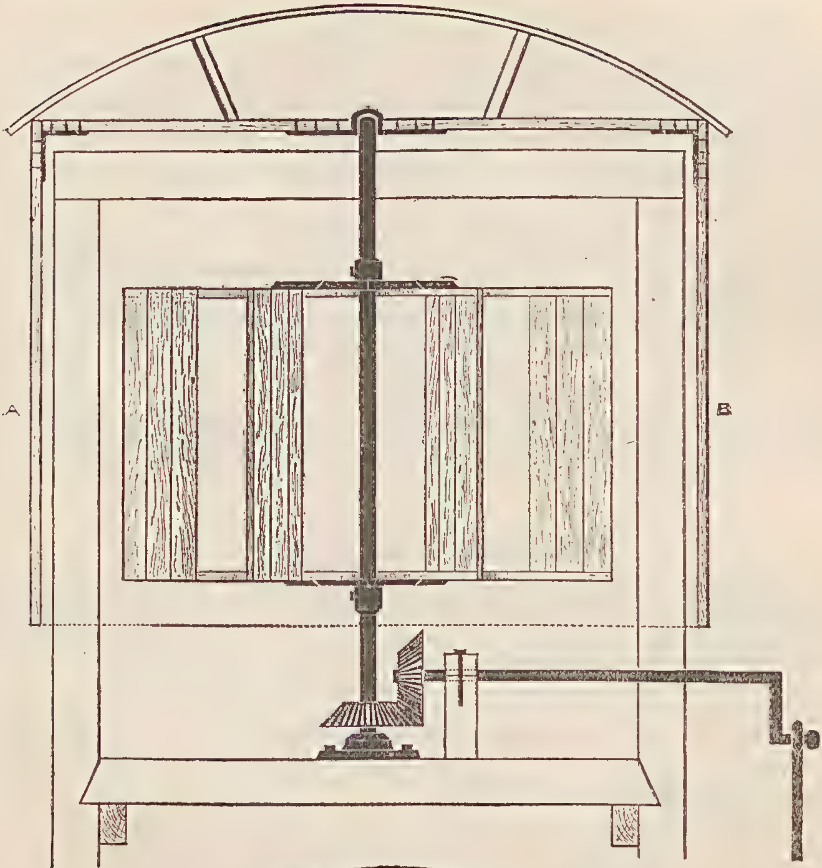
General Notes.

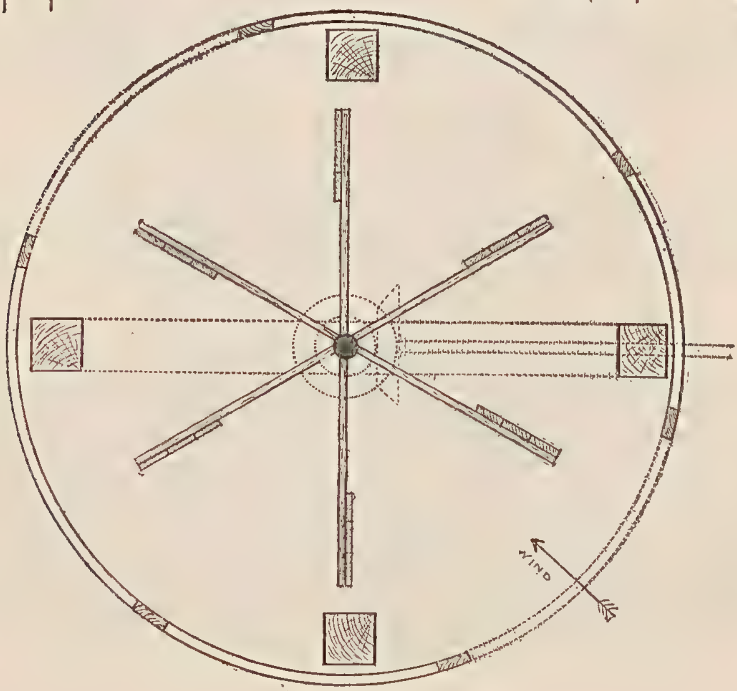
RAINMAKING BY BALLOONS.

In Texas last year the United States Agricultural Department instructed Mr. Carl E. Myers (the great balloon farmer of the States, who has cornered all the silk there suitable for balloon-making) to construct a balloon 12 feet in diameter to contain 900 cubic feet of mixed gas for the purpose of trying experiments in rain-producing. The balloon, when completed, ascended 1 mile, and being filled with oxygen and hydrogen was exploded by electricity, producing widespread atmospheric disturbance. A large building was blown to the ground by the concussion, and hundreds of fish were killed in the stream below by the explosion. Within 5 minutes (although there were only a few white clouds in the sky, and there had not been any signs of rain for days) there was a heavy continuous fall of rain for nearly one hour. This appeared a convincing proof that experiments of this kind conducted rightly will be instrumental in producing rainfall.

IMPROVED JUMBO VERTICAL WINDMILL.

Mr. H. R. Stephens, who some time ago described a home-made windmill which he called the "Jumbo Windmill," has made an improvement on the original design. The old "Jumbo" worked on a horizontal bar—that is, the shaft turned horizontally—and, while this is convenient for transmitting the power from the crank to the pump-rod, it laboured under the disadvantage that the windmill could not be turned to suit changes of wind, even to a few points of the compass. The vertical "Jumbo" (here illustrated), on the other hand, is capable of being regulated by a shield which can be moved in any direction, and the windmill worked whatever the direction of wind may be, in the same way as the ordinary factory mills and air-motors. Say a vertical "Jumbo" of 10 feet diameter is required with six arms, the method of construction of the wheel would be about similar to that of the horizontal type, and the improvement consists in the shield or casing which protects one-half of the wheel from the wind, and which may be turned on the mill axle and adjusted accordingly. The illustration on opposite page explains the action.





SECTION at A.B.

PREVENTIVE AND CURATIVE SERUM FOR ALL ANIMALS.

M. Lignières has, says the *Pastoralists' Review*, made researches on diseases arising from *cocco-bacillus* of the same order as that in distemper, which affects horses, cows, pigs, and birds. It is reported that he has discovered a preventive and curative serum for all animals. It cures typhoid in the horse, pneumonia in cattle, as well as distemper in dogs.

KEEPING POOR COWS.

Only a rich man can afford to keep poor cows, but it is only the poor man who does keep them. The rich man, who looks carefully after the dollars, pays a high price for an animal, and still makes a profit; the poor man buys a poor cow, thereby saving money in the wrong place, and then works double time, feeds more food, gets less returns, and comes out a loser at the end of the year. Better buy one good cow than two poor ones, for the same money. The old parable of the man who built his house upon the sand applies to other things besides houses, although frequently the application is not so evident. So says *Hoard's Dairyman.*

BLACKLEG IN CALVES.

A Clermont correspondent, Mr. C. Keune, writes:—I have used garlic for years with great effect in the following way—Open the dewlap, make a hole with a steel, and place one clove of garlic in the hole, then pass clean seaming twine through with a pack-needle to keep the garlic from falling out.

CAPACITY OF TANKS.

When calculating the capacity of tanks, 31½ gallons are estimated to one barrel and 63 gallons to one hogshead.

A CIRCULAR TANK ONE FOOT IN DEPTH.

		Galls.
5 feet diameter holds	... ...	122½
6 ditto	... ...	176½
7 ditto	... ...	240½
8 ditto	... ...	314
9 ditto	... ...	397½
10 ditto	... ...	490½

A gallon of water weighs 10 lb., and measures 277·274 cubic inches; a cubic foot of water contains 6·23 gallons, and weighs 62·35 lb.; 1 cwt. of water contains 11·2 gallons, and measures 1·8 cubic feet; 1 ton of water contains 224 gallons, and measures 35·9 cubic feet.—*Home paper.*

CURE FOR TAPEWORMS IN DOGS.

In an article on "Tapeworm in the Dog," appearing in the June number of the *Agricultural Journal of Victoria*, the following recommendations are made under the head of treatment: To expel tapeworms from dogs no remedy succeeds as well as areca nut. The dog should be kept off food for about twelve hours, and then from 15 to 60 gr. of powdered areca nut should be given in a little milk. A dose of 30 gr. will suffice for a dog weighing 25 lb., and 60 gr. may be given to a very large dog, and 15 gr. to a little one. About a couple of hours after the administration of the areca nut a dose of castor oil should be given and the dejecta watched for the segments or joints, which may be seen to be crawling about, and these should be burnt before they get a chance to burst and scatter the eggs which they contain.

RUSTY WHEAT.

Should rust make its appearance in the wheat this year, it is recommended by Mr. Molineux, late editor of the *South Australian Journal of Agriculture*, to cut the wheat with a binder as soon as it is past the dough stage, and allow it to ripen in the stooks. His opinion is that cutting the wheat would arrest the progress of the fungus, and that, unless the grain was already affected, it would fill out all right. The *Australian Agriculturist* says that several farmers who adopted this practice with part of their crops have since reported that, while they got a good sample from the wheat they cut and thrashed, the portion of the crop left for the stripper was badly affected by rust. Farmers would do well to test this matter for themselves should rust, unfortunately, attack the crops this year, and, even if the grain should not fill out in the sheaves, they will have a supply of hay.

CORNSTALKS.

It is estimated that the stalks, leaves, and husks of the corn plant, which have hitherto been burnt or otherwise got rid of as useless, contain about 40 per cent. of the nutritive value of the plant.

PRESERVING SOFT FRUITS.

We hear that Dr. A. A. Brown, of the Department of Agriculture of Victoria, has discovered a process by which soft fruits may be preserved for indefinite periods. His long-continued experiments have produced such satisfactory results that the work will probably be continued by the Government. In July last, Dr. Brown showed the Minister for Agriculture grapes, pears, and peaches, which had been in cool storage for eleven weeks, and which were perfectly sound. The treatment is understood to be that in which formic-aldehyde acid gas is the chief feature.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

GOATS AND WATER—DESTROYING OPOSSUMS.

W. Hobart, One-tree Hill, Toowoomba—

Question 1.—How long can a goat live without water? I have some goats running on a very high precipitous mountain. They never come down. There is no water at or near it to my knowledge. They are in good condition, whilst everything else is perishing.

Answer 1.—Goats, like rabbits, do not appear to require water, like most other animals. We have seen numbers of goats in Australia, but cannot remember ever having seen one drinking. There is a flock of Angora goats in Central Australia, running north of Lake Eyre, where the annual rainfall for the past twelve years has only been about 3 inches. Sheep in England and in the Highlands of Scotland are never watered. In the days when we kept pet rabbits, water was considered dangerous for them. Probably, goats are similarly constituted. The fact you mention, however, points to the possibility of establishing large flocks of goats on high arid ridges, inaccessible to cattle or sheep. Goat skins have a good market value, and goat's flesh is quite equal to mutton.

Question 2.—What is the easiest way to destroy opossums?

Answer 2.—This question was answered in the last (October) issue of the *Journal*.

AGRICULTURAL BANK.

A correspondent, writing from the Carron River, Croydon Gold Field, asks:—

Question 1.—Will persons occupying farms on the goldfields areas under the Goldfields Homestead Act be eligible for advances from the State Agricultural Bank for the purpose of obtaining necessary agricultural implements?

Answer 1.—Advances may be made upon mining homestead leases, but only for the purpose of effecting improvements thereon, and not for the purpose of obtaining agricultural implements.

Question 2.—If eligible, when can such advances be obtained?

Answer 2.—Applications for advances are considered on their merits, and, if approved, advances are obtainable on the completion of the documents required by the Act.

Question 3.—To whom must application for such advances be made?

Answer 3.—To the trustees of the Agricultural Bank.

CASSAVA.

Q.E.D., Stanthorpe.—Cassava cuttings can be obtained at the Kamerunga State Nursery, Cairns. Make application to the Under Secretary, Department of Agriculture. Cuttings may also be obtained from the Acclimatisation Society, Brisbane.

The May number of the *Journal* (1902) contains full directions as to planting cassava and manufacturing the farina. There are two kinds of cassava—the sweet and the bitter. The former is quite innocuous, and tastes much like a sweet potato. The latter is very poisonous, but the poison—hydrocyanic (prussic) acid—is entirely confined to the juice. So volatile is the poison that if the sliced roots are left in the sun they may be fed to cattle with no evil results.

WATER GLASS.

M.E.H., Bogantungan.—Water glass is silicate of soda. It can be obtained at Messrs. Elliott Bros., wholesale chemists, Brisbane. Price, about 3d. per lb. No charge is made for replies to questions.

RULE TO FIND THE VOLUME OF A DAM WITH SLOPING SIDES.

Find the area of the top and bottom. Add these areas together. Then find the area of a section parallel to the top and bottom and half way between them. Multiply this by 4, and add the result to the sum of the two areas found. Now multiply the total sum by the depth, and one-sixth of the product will be the volume of the dam.

The answer given in the July issue of the *Journal*, page 64, was worked by this rule. (Diag. 1.)

Diagram 1

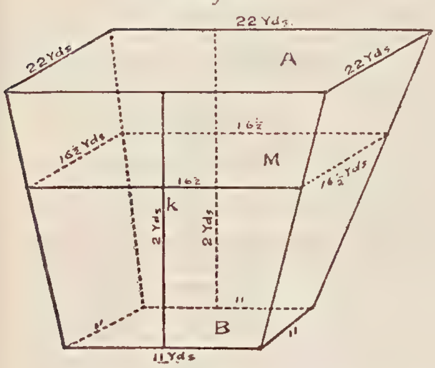
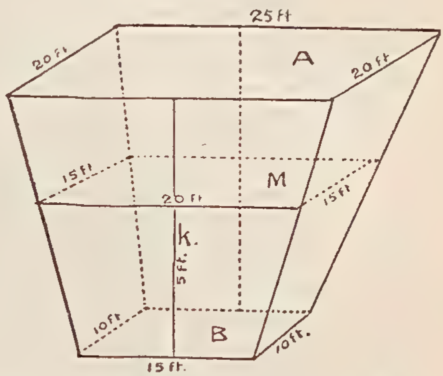


Diagram 2.



The excavation is in the form of a frustum of a wedge. If A and B are the areas of the top and bottom and M the area of the mid-section parallel to the ends, and k the depth, then the volume of the dam $= \frac{k}{6}(A + B + 4M)$

Thus— $A = 22 \times 22 = 484$ square yards

$B = 11 \times 11 = 121$ " "

$M = \frac{1}{2}(22 + 11)$ and $\frac{1}{2}(22 + 11)$ that is $16\frac{1}{2}$ yards and $16\frac{1}{2}$ yards $\therefore M = 16{\cdot}5 \times 16{\cdot}5 = 272{\cdot}25$ square yards

$4M = 1{,}089$ square yards. $k = 2$ yards

Hence $\frac{2}{6}(484 + 121 + 1{,}089) = 564\frac{2}{3}$ cubic yards.

In the case of your dam (Diag. 2) the calculation is the same, substituting feet for yards Thus –

The volume of the dam $= \frac{k}{6}(A + B + 4M)$

Here we have—

$A = 25 \times 20 = 500$ square feet

$B = 15 \times 10 = 150$ " "

The mid-dimensions are $\frac{1}{2}(20 + 10)$ and $\frac{1}{2}(25 + 15)$ that is 15 feet and 20 feet.

Therefore—

$M = 15 \times 20$ square feet $= 300$ square feet

$4M = 1{,}200$ square feet

$k = 5$ feet

Hence the volume is—

$\frac{5}{6}(500 + 150 + 1{,}200)$ cubic feet $= \frac{5}{6} \times 1{,}850 = 1{,}541\frac{2}{3}$ cubic feet $= 57{\cdot}09$ cubic yards

NOTE.—The depth is shown out of proportion to the scale in order to clearly define the middle section.

TO TAN HIDE FOR WHIP-MAKING.

GEORGE GRAHAM, Garradunga—You do not say what kind of whip you wish to make nor what hide you propose to use. If you want to make a stockwhip of kangaroo hide, the latter must be tanned. If of calf or bullock hide, tanning is not necessary. To tan a skin, the general principle is to trim off the useless parts of the skin and remove all fat from the inside. Then soak the skin in warm water for about an hour, then apply a coating of borax, saltpetre, and Glauber salts—1 oz. of each dissolved in sufficient water to make a thin paste. The following day, give a coating of a mixture of 1 oz. of sal soda, ½ oz. of borax, and 2 oz. of hard soap. This mixture should be slightly heated without allowing it to boil. After this, fold the skin together and leave it in a warm place for twenty-four hours. Then take 4 oz. alum, 8 oz. salt, and 2 oz. saleratus; dissolve in hot water and, when cool, soak the skin in it for twelve hours, wring out, and hang up to dry. If the skin is not sufficiently soft after this, the soaking and drying must be repeated two or three times.

Another method is to wash the skin in a solution of sal soda and water. Then take 4 oz. powdered alum, 8 oz. salt, 1 quart new milk to 4 gall. salt water, 1 pint prepared starch; stir well, then put in the skins, and air them often by hanging them over a stick laid across your tan tub. Handle them occasionally until they have been in the solution a day or two. Then remove the skins and add to the liquor a-half teaspoonful of sulphuric acid. Stir this well in. Put the skin back and steam them well for about an hour. Then wring out the skins in lukewarm water and hang them up in a cool place; when they begin to get white, work and stretch them till dry. Hides of animals larger than kangaroos should remain longer in the solution.

When making a whip of calf skin or bullock hide, use the hide green. Soak it well, shave off the hair and under side with a sharp knife, stretch well after cutting into strips of the required size.

To remove the hair or wool before tanning.—First wash the skins thoroughly in water; then place them one above the other, with the flesh side up. Then saturate each skin on the flesh side with a thick cream of lime, after which double them, with the hairy side out. Let them remain there for twenty-four hours, when the wool or hair should be loose; remove it, and leave the skins to soak in weak lime and water. Remove them twice a day, and stir up the liquor before replacing them. Continue this treatment for three days, after which place them in stronger lime liquor, and draw daily as before. In seven days whatever hair has been left on should be easily removed. The next step is unhairing and fleshing—that is, the scarf skin and remains of hair are removed with a blunt knife, and all fat and flesh is taken off with a sharp one. Soak the skins well in some preparation of ammonia to convert the lime in the pores into soluble salts, which may then be removed by washing and scraping.

PALM-TREES FOR STOCK.

ANDREW COBB, Gregory, Cordalba.—The heart of palm-trees is very good fodder for stock, failing anything else.

IGUANA OIL.

A.S.S., Lowmead.—Iguana oil is not used for machinery, owing to its cost. On a small scale it might be serviceable. For oiling guns and for leather it is of great value, being exceedingly penetrating. The best way to extract the oil from the fat is to expose the latter to the sun in a bottle, and afterwards strain off.

KEEPING WEEVILS OUT OF GRAIN.

E. Dunlop, Nobby.—The only cheap and perfect means for the prevention of weevil upon grain consists in the employment of bi-sulphide of carbon. The quantity required, provided the grain is kept in close vessels, is very small—not more that $1\frac{1}{2}$ lb. to each ton of grain—so that the cost of preserving a ton of wheat is under 1s. The bi-sulphide leaves no disagreeable taste or smell behind, and the quality of the grain remains unimpaired. When bags are used instead of iron tanks the protective influence of the chemical soon ceases, and a fresh application must be made. In either case, the liquid is applied as follows:—

A ball of tow is tied to a stick of such a length that it can just be plunged into the middle of the receptacle holding the grain. The tow receives the charge of bi-sulphide like a sponge, and is then *at once* plunged into the sack, or tank, and left there, the mouth being closed tightly. When necessary the stick may be withdrawn, and the charge, which is 1 oz. bi-sulphide to 100 lb. grain, renewed. There is no need to first expel the air from the tank.

EXCELSIOR INCUBATORS.

A correspondent is informed that the agent for these machines is Mr. William Graves, manager of Messrs. Baynes Bros.' Poultry Farm, Belmont, South Brisbane.

COOLING CHAMBER FOR A DAIRY.

Dairyman, Geeham.—The construction of a cooling chamber without the adjunct of a refrigerating plant has often been tried, but without any really good results. The simplest method of cooling is by the use of large water-bags, or by building a chamber with insulated walls. In the January (1902) issue of the *Journal* we illustrated an article by Mr. G. Monks, One-mile, Gympie, on the subject of artificial cold, and the construction of a simple cold chamber. We would advise our correspondent to communicate with Mr. Monks, who will doubtless willingly give all information on the subject.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	OCTOBER. Top Prices.
Apples, eating, per case	10s.
Apples, cooking, per case	8s. 6d.
Apples, American, per case	12s. 6d.
Oranges, per case	11s.
Mandarins, Scarlet, per case	7s.
Lemons, per case	14s.
Lemons, Californian, per case	32s. 6d.
Cumquats, per quarter-case	3s.
Gooseberries, per quart	5d.
Loquats, per half-gincase	5s.
Pawpaw Apples, per quarter-case	3s.
Pineapples, rough, per dozen	5s.
Pineapples, Smooth, per dozen	6s. 6d.
Pears, American, per quarter-case	8s.
Tomatoes, per quarter-case	6s. 3d.
Bananas, per bunch	1s. 3d.
Bananas, per dozen	$2\frac{1}{2}$d.

AVERAGE TOP PRICES FOR SEPTEMBER.

Article.		September. Top Prices. £	s.	d.
Bacon	lb.	0	0	9⅝
Bran	ton	8	7	8
Butter, First	lb.	0	1	4¼
Butter, Second	„	0	1	2¼
Chaff, Mixed	ton	8	2	6
Chaff, Oaten	„	8	0	0
Chaff, Lucerne	„	13	5	0
Chaff, Wheaten	„	7	0	0
Cheese	lb.	0	0	10
Flour	ton	11	0	0
Hay, Oaten	„	7	0	0
Hay, Lucerne	„	9	0	0
Honey	lb.	0	0	3
Rice, Japan (Duty paid)	ton	23	0	0
Maize	bush.	0	6	1¾
Oats	„	0	4	3½
Pollard	ton	8	7	6
Potatoes	„	7	16	3
Potatoes, Sweet	„	Nil.		
Pumpkins	„	8	12	6
Sugar, White	„	19	0	0
Sugar, Yellow	„	16	10	0
Sugar, Ration	„	13	0	0
Wheat	bush.	0	5	7½
Onions	cwt.	0	8	9
Hams	lb.	0	1	0⅝
Eggs	doz.	0	0	10½
Fowls	pair	0	4	0
Geese	„	0	5	4¾
Ducks, English	„	0	4	0
Ducks, Muscovy	„	0	4	9¾
Turkeys, Hens	„	0	6	9
Turkeys, Gobblers	„	0	15	1½

ENOGGERA SALES.

Article.	September. Top Prices. £	s.	d.
Bullocks	18	2	6
Cows	14	17	3
Wethers, Merino	1	11	9
Ewes, Merino	1	4	0¾
Wethers, C.B.	2	1	3
Ewes, C.B.	1	6	1½
Lambs	0	14	3
Baconers	2	2	3
Porkers	1	9	3
Slips	0	6	1

Orchard Notes for November.

By ALBERT H. BENSON.

The earliest varieties of summer fruits will be ready to market during November; and as this is the beginning of the season, I beg to call the special attention of every fruitgrower in the State to the importance of gathering and destroying all fly-infested fruits now if he wants to save any crop at all, as the neglect to destroy the first crop of flies will result in the loss of the succeeding crops of fruit. It is impossible to over-estimate the importance of destroying the early crops of fruit flies, as if left alone they breed so rapidly that the fruit crop is soon infested and destroyed.

The best way of destroying the first crops of flies is to gather and boil all infected fruit; such fruit, when boiled, to be fed to pigs or other animals. Feeding the fruit without boiling will result in the escape of a number of the maggots, and is therefore undesirable, besides being contrary to the Regulations of the Diseases in Plants Act.

Every fruitgrower should make it his business to see that his orchard is kept free from this pest, and not only his own orchard, but that his neighbours keep their trees free as well. All useless trees, such as inferior seedling peaches, guavas, &c, growing by hedge or fence sides, should be destroyed, as the fruit is valueless, and only becomes a harbour and breeding-ground for the fly. Unless fruitgrowers take action—combined and systematic action—to deal with this pest, it will never be kept in check; and for such action to be effective, it is best to destroy all trees that produce unsaleable fruit, and to concentrate one's energies in keeping such trees clean that produce fruit of such a quality that it will command a ready sale. The marketing of fruit is a matter also that requires much more care and attention than is usually bestowed upon it. In many instances really good fruit is completely spoilt by carelessness in gathering, handling, and marketing, and is consequently valueless; whereas, had it been carefully gathered, properly graded for size and ripeness, and packed in such a manner that it will carry well without bruising, and when opened up show to best advantage, it would have realised a satisfactory price. First-class fruit always pays to be well handled and well packed, as for such fruit there is always a good demand; but for badly handled, undersized, and bruised fruit there is little if any demand—at any rate, at remunerative prices. First-class early peaches, such as the Alexander or Brigg's Red May, grown on the Downs, would pay to be carefully wrapped in tissue paper and packed in trays holding one layer of fruit, as, if marketed in such a manner, they could be placed on the Brisbane market in first-class condition, and would realise good prices. First-class apricots, such as the Moorpark, would also pay to be handled in the same manner. Fruitgrowers should bear in mind that the better condition in which they market their fruit, and the more attractively it is got up, the better the chance of its realising a satisfactory price.

During the month, the Orchard should be kept well cultivated, especially in districts where the rainfall is light; and in such districts, if water is available for irrigation, a good watering should be given to all fruit trees and vines. By a good watering I don't mean damping the surface, but giving the soil a thorough soaking, as one good watering is worth a dozen small ones. Attend to the summer pruning of all young trees, removing any superfluous branches and pinching back all strong growths. Attend to the cultivation of the nursery; stake all grafts or buds, so as to produce straight, well-grown trees, the bud or graft being topped at the height that it is wished to form the head of the future tree.

Farm and Garden Notes for December.

FIELD.—The wheat harvest should now have been in full swing all over the wheat-producing districts of the State; but, unfortunately, owing to the severe drought, the harvest will be a mere nominal one. After the magnificent wheat yield of 1901-1902, high hopes were entertained that that of 1902-1903 would have reached 2,000,000 bushels, but, when the month of September had passed without any rains to germinate the seed, the last hope was abandoned. It then only remained to prepare as much land as possible for maize. Thus our best month of the spring season for general planting and sowing was lost. Farmers, from time immemorial, have been called grumblers, but very little grumbling is heard amongst the Queensland farmers. They take the visitation philosophically, on the principle that what can't be cured must be endured. Should good rains fall, the land under the plough will quickly resume its normal covering of green and luxuriant crops.

After the rain, sow maize, panicum, imphee, Kafir corn, sorghum, and plant arrowroot, ginger, and sweet potatoes.

KITCHEN GARDEN.—Gather cucumbers, melons, vegetable marrows, and French beans as soon as they are fit for use. Even if they are not required, still they should be gathered, otherwise the plants will leave off bearing. Seeds of all these may still be sown for a succession. Tomatoes should be in full bearing, and the plants should be securely trained on trellises or stakes. Take up onions, and spread them out thinly on the barn floor until the tops wither sufficiently to pull off easily. They should then be graded into sizes, and sent to market or stored in a cool dry place. Where there is an unlimited supply of water, and shade can be provided, lettuce and other salad plants may still be sown.

FLOWER GARDEN.—Keep the surface of the land well stirred. Do not always stir to the same depth, otherwise you are liable to form a "hard pan," or caked surface, beneath the loose soil. Alternate light, with deep hoeings. A few annuals may still be planted, such as balsams, calendulas, cosmos, coreopsis, marigold, nasturtium, portulacca, zinnia, and cockscomb. Plant out whatever amaranthus may be ready. They may still be sown in boxes. Clear away all annuals which have done flowering. Bulbs should have all the dead leaves cut away, but the green leaves should not be touched. Stake chrysanthemums, and, as the flower buds develop, give them weak liquid manure. Coleus may now be planted and propagated from cuttings. Dahlias are in various stages, but the greater part will have been planted by this time. Give them liquid manure, and never let them dry up. Lift narcissus about the end of the year, but do not store them. Plant out at once in their new positions. Top dress all lawns.

Department of Agriculture.

EXTRACTS FROM THE REPORT OF THE HONOURABLE THE SECRETARY FOR AGRICULTURE.

"AGRICULTURAL AND PASTORAL SOCIETIES.

"Out of the 140 societies applied to some months ago for information required for this Report, only 84 have forwarded the necessary particulars. Of these 84, the Royal Agricultural Society of Toowoomba, founded in 1860, is the oldest. That society has also the largest revenue, and has spent the largest amount in improvements. Its revenue last year was £1,326, and its total improvements to date are valued at £3,500. The society with the largest membership is the Lockyer Agricultural and Industrial Society, Laidley, which has 302 members, of whom 201 are agriculturists. This is the largest number of agriculturists shown by any society. In a membership of 111, the Longreach Pastoral and Agricultural Society has no agriculturists, and out of 258 members the Townsville Pastoral, Agricultural, and Industrial Association has only 11 agriculturists. The last-mentioned society expended the most money during the year—viz., £1,657, of which £241 was for salaries and wages. The Drayton and Toowoomba Agricultural and Horticultural Society offered the largest amount in prizes—viz., £309, allotted thus: £157 for stock exhibits; £75 for agriculture; £9 for dairy produce; £49 for "jumping events"; and £19 for competitions classed as miscellaneous. Eight societies confined their work to the holding of shows. Of the rest, while most can claim that they exist to further the general interests of agriculture, relatively few give details of their operations. Among the honourably conspicuous exceptions, the most conspicuous is the Drayton and Toowoomba Agricultural and Horticultural Society, whose secretary's report is convincing proof that the society neglects no means or opportunity of promoting the interests of the farmer."

[Since the above paragraph was published, the National Agricultural and Industrial Association of Queensland has furnished the Department with the particulars asked for early in the year. These particulars show that the society contains 675 members, of whom 97 are agriculturists. Its revenue for the year was £4,311 9s. 6d., and its expenditure £4,742 18s. 9d., of which £985 12s. 10d. was in wages and salaries. The value of the prizes offered was £1,352 15s. 6d., allotted as follows:—Horses, cattle, sheep, and swine, £673 2s. 6d.; poultry, dogs, and canaries, £100; district societies, £200; industrial, £65 17s. 6d.; dairy produce, £40 13s.; agricultural, £102 2s. 6d.; jumping, £146; woodchopping, £25. The amount spent in improvements during the year was £120.

It may be stated that the societies furnishing returns have on their rolls 5,765 members, of whom 2,794 are agriculturists. The total income of all these societies is £14,985, and the total expenditure £16,545. The total amount given by them in prizes was £3,788 14s. 6d., of which £1,088 1s. 9d. was for agricultural exhibits.

Thanks are due to the societies which have given the information requested. The compliance was the more considerate because only 41 of them receive subsidy; and even in the case of the subsidised societies, the furnishing of the statistics asked for is not as yet a condition of the grant.]

"QUEENSLAND AGRICULTURE GENERALLY.

"The prominent features of our agrarian industries during the last few years have been—the steady increase in the areas under cultivation, the development of the sugar industry, the establishment of the modern dairy system, the attention given to the cultivation of particular products—notably wheat, malting barley, coffee, and tobacco—and the sale of wheat and wool by auction instead of direct to the individual buyer.

"Every year shows an increase in the area under cultivation. The additions for 1901 represent 26,945 acres, which the Registrar-General finds is a centesimal increase of 5·61. The increase in population for the same period was only 2·46 per cent. The principal increase was in the area placed under fodder plants, which shows that the farmers are becoming more alive to the necessity for providing for their stock food other than the natural grasses. Of the principal crops, the advance for wheats, oats, barley, and rye was 13,415 acres; sugar-cane increased by 3,496 acres, and fodder crops by 18,906 acres. The decreases were—in maize 10,991 acres, and in rice 66 acres. The grain crop, therefore, shows a net increase of 2,358 acres.

"*Wheat.*—The wheat crop for 1901 was on the whole satisfactory. The area under crop for grain rose from 79,304 acres in 1900 to 87,232 acres in 1901, the total yield from 1,194,088 bushels to 1,692,222, and the average yield from 15·06 bushels to 19·40 bushels to the acre. Though rust affected 10,070 acres, the crop was such a good one that even with this misfortune the average yield has been only once exceeded—in 1894—when it reached 19·48 bushels to the acre. For a comparison, the wheat crop of South Australia may be taken. There, it is stated, 1,415,658 acres were reaped for an average of 4·60 bushels to the acre. The Allora district covered the largest area, with 22,131 acres; the Toowoomba district came next with 18,609 acres; the third in order was Warwick, with 14,762 acres. The highest average return was in the Nanango district, with 22·23 bushels to the acre, followed by Crow's Nest, with 20·12 bushels. The average yield of wheat in the various States of Australia are:—

Queensland	19·40 bushels
New South Wales	10·60 ,,
South Australia	4·60 ,,
Western Australia	9·96 ,,
Victoria	6·91 ,,

"The imports for 1901 were equal to 1,820,240 bushels, and the quantity grown in Queensland was 1,692,222 bushels. If the total be valued at 3s. 2¼d. per bushel it will be seen that the requirements of the raw material for the present population amount to £559,798 12s. 7d. The quantity produced in Queensland in 1901 was 48 per cent. of the total requirements. Two new flourmills were erected, making a total of 18. The value of the flour made by all mills was £204,842, of bran and pollard £38,182, and of meal £1,605.

"*Barley.*—Malting barley was grown on 6,818 acres, as against 6,302 acres in 1900; and the yield was better by 11·27 bushels to the acre, the average for 1901 being 28·39 bushels to the acre. Toowoomba had the largest crop with 2,440 acres; Allora came second with 1,358 acres; and Warwick third with 1,219 acres. The total yield was 193,538 bushels, as against 107,910 bushels for 1900. The total requirements of malt for the State were 191,424 bushels, of which 36 per cent. was made from Queensland barley, the imports of malt being 121,424 bushels; but of the malt made in Queensland, 69,000 bushels or 98·6 per cent. were made from Queensland grown material. In 1900 the proportion was 79 per cent.

"*Maize.*—Maize showed a fairly average yield for the State, but in some districts there were failures, of which the dry weather that followed the planting was the cause. The acreage planted fell from 127,974 in 1900 to 116,983 in

1901, but the average yield rose from 19·20 to 21·96 bushels to the acre. The reduction in the area for grain was 10,991 acres. The greatest decrease was in the Allora district, where the area for 1901 was less than one-half of that for 1900, the decrease being 5,878 acres. The imports of maize for the past three years have been:—

	Bushels.	Value.
1899	501,179 ...	£89,256
1900	247,449 ...	42,388
1901	131,601 ...	23,307

"*Sugar.*—The sugar crop of 1901 was an improvement on the previous year, but did not come up to the returns of 1898. The figures for the four years are:—

	Acres Crushed.	Average Yield of Sugar per Acre.
1898	82,391 ...	1·99
1899	79,435 ...	1·55
1900	72,651 ...	1·28
1901	78,160 ...	1·55

"The total weight of cane crushed in 1901 was 1,180,091 tons, or an average of 15·10 tons to the acre. The weight of cane required to make a ton of sugar was 9·76 tons. The number of factories in connection with the industry were:—

Refineries	2
Sugar Manufactories	52
Crushing Mills only	6
	60

"The total weight of sugar was 120,858 tons. The quantity exported was 81,024 tons for the sugar year, which ended on the 31st of May, 1902, and the estimated requirements for Queensland were 28,270 tons. The surplus of the operations of last season was 11,564 tons. The sugar content of the canes was not so high as in 1900, and it took on an average ·59 tons more cane to make a ton of sugar. This was caused in the Central and Northern districts by the lateness of the rains, which did not fall until February; the cane did not make growth, and was immature; in addition to which it was affected by frost, and its density consequently lowered. The Southern district produced a ton of sugar from 10·43 tons of cane, as compared with 10·77 tons in 1900. It is estimated that the annual consumption of sugar in the Commonwealth of Australia amounts to about 176,031 tons, so that with a return of normal seasons and the benefits of interstate freetrade there should be sufficient inducement for the extension of the area under sugar-cane, in order to obtain command of the sugar market in the Commonwealth. The prospects for the season of 1902 are particularly good in the North, but the Central and South will show a considerable shortage, owing to the continuance of the drought. The output for the whole State may be less than in 1901.

"*Fruit.*—In the matter of fruits there are some in which Queensland is able to face the Southern markets without any risk of serious rivalry, notably bananas, pineapples, and mangoes. It is in the North that the cultivation of the banana has been prosecuted upon lines beyond the wants of the local market; and it is by the North that practically the whole of the export trade in bananas is done. The number of bunches produced in 1901 was 2,313,719, of which the Cairns district yielded 575,760 bunches and the Mourilyan district 1,246,695 bunches. These added together are equal to 79 per cent. of the banana production of the whole State; and the area represented was 69 per cent. of the area under bananas in Queensland. It is in the Southern part of this State, on the other hand, that the pineapple is cultivated to the greatest extent. Of the 1,020 acres devoted to it, no fewer than 638 acres or more than

62·549 per cent. of the whole are in the neighbourhood of Brisbane. Next to the banana and the pineapple among the fruits for the supply of which the other States of Australia look to Queensland, may be classed the mango, though it is at present a much less profitable export than either. Attention may also be drawn to the citrus fruits, the cultivation and export of which are annually expanding. The picking time being earlier here than in the South, good prices can be obtained by the grower if care be taken to send only the best fruit to market. The area under oranges in 1901 was 3,083 acres, an increase of 201 acres over the previous year. The production, however, fell from 2,041,068 dozen in 1900 to 1,880,264 dozen in 1901. The Maroochy district has 674 acres under crop, and the Maryborough district 364 acres. The total area under grape vines fell from 2,019 acres to 1,990 in 1901, but the yield increased from 3,634,949 lb. in 1900 to 4,063,109 lb. in 1901, the average yield for the latter year being 2,403 lb. of grapes to the acre. The season was fairly good, the average being the highest for the past five years. The Roma district far exceeds other districts for the cultivation of the grape vine, the total area under vines there for 1901 being 550 acres, Brisbane coming next with 162 acres. In 1901 there were 538 manufacturers, who made 148,835 gallons of wine and 1,112 gallons of brandy. The imports for the year were valued at £31,140, represented by 5,054 gallons of sparkling and 51,037 gallons of other wine. Though with interstate freetrade much wine will be imported from the South, Queensland vignerons would be able to command the local markets if they took the advice of the Viticulturist as to the kinds of grapes to be grown and the kind of soil to be planted with them.

"*Tobacco.*—Practically the whole of the Queensland tobacco crop is grown in the Carnarvon district Of the total area of 768 acres under crop in 1901, 692 acres were in the Texas and 72 acres in the Inglewood district. The average production was better than in 1900, the yield being 7·6 cwt., as against 6·1 cwt. per acre in the latter year. A small area formerly under tobacco in the Cairns and Cardwell districts has apparently been abandoned or turned to other uses. The increase for 1901 as against 1900 was 103 acres and 1,816 cwt. of leaf. The value this industry might become to Queensland—for there seems to be no doubt about the suitability of our soil and climate for tobacco-growing—is shown by the value of the imports, which, for all classes of tobacco, amounted to £100,315 in 1901, £91,766 in 1900, and £110,075 in 1899.

"*Coffee.*—The area under productive trees in 1901 was 370 acres, and that under non-productive trees 177 acres; the increase in the productive area was 87 acres. The yield for the year was 130,293 lb., but, in a comparison with the yield for 1900, shows a decrease of 9 lb. per acre, the yield for 1900 being 361 lb. to the acre. It is in the North that coffee cultivation is most closely followed. There were in that division of the State 472 acres under coffee out of a total for the whole of 547 acres. The Cairns district, in which the Instructor in Coffee Culture has his headquarters, had 213 acres under cultivation, the district next in area being Mackay with 49 acres. The imports for 1901 were valued at £6,153, and the exports at £215. It is estimated that the present production is equal to only 45 per cent. of our requirements. Our coffee-growers, therefore, have still scope for considerable expansion before local wants are fully satisfied; after which there still remains the wider field of enterprise left open to them by the wants of the other parts of the Commonwealth. Mr. Newport, in the early part of this year, visited Victoria and New South Wales to bring the Queensland coffee under the notice of the public and to ascertain what share this State could reasonably expect to have in the trade generally. The annual imports of coffee into Victoria and New South Wales amount to about 300 tons each, and into South Australia, West Australia, and Tasmania about 400 tons. Excluding Queensland, the requirements of the Commonwealth amount to about 1,000 tons a year. The production in the State for 1901 slightly exceeded 58 tons.

"*Dairying.*—The drought has had such an effect on this industry in all its branches that for the remainder of this year at least we shall be importing instead of exporting. Notwithstanding the dry weather in 1901, there was a fair expansion in the industry. The quantity of milk dealt with was 26,286,459 gallons, as against 21,884,407 gallons in 1900, an increase of 4,402,052 gallons in one year. The output of butter was 9,741,882 lb., as against 8,680,389 lb. in 1900. If these quantities can be dealt with in a dry year, there will be no fear for the industry when the seasons have again become normal and prosperity has returned. The export trade has continued to grow, and it is greatly to be regretted that the disastrous year of 1902 will break through arrangements that have gradually been built up since the industry was started. The export figures for the past five years are—

1897	186	tons, valued at		£16,251
1898	433	,,	,,	37,286
1899	517	,,	,,	49,429
1900	620	,,	,,	51,662
1901	931¼	,,	,,	86,150

"Of the total output of butter 1,809,669 lb. were made by farmers, and 7,932,213 lb. by factories. For cheese, 2,410,627 gallons were treated with a return of 2,436,912 lb. The manufacture of hams and bacon was less by 610,732 lb. than in 1900, and the export of these articles was reduced by £14,438 in value. The figures for the years 1900 and 1901 are:—

	900.	1901.
Number of pigs in State ...	122,187 ...	121,641
Bacon and hams made ...	7,685,446 lb. ...	7,074,714 lb.
Bacon and hams of local manufacture exported, value ...	£45,831 ...	£31,393."

ANNUAL REPORTS.

In this issue we publish the usual annual reports of the instructors in the various branches of agriculture, fruit, and coffee culture; also the reports of the Principal of the Queensland Agricultural College and of the managers of State farms and nurseries, which heretofore have appeared in the Annual Report of the Secretary for Agriculture.

REPORT OF THE PRINCIPAL OF THE QUEENSLAND AGRICULTURAL COLLEGE.

The year under review has been one of the most trying in the history of the College. Here, as in other parts of the State, we have suffered very much from the effects of the prevailing drought, not only in the matter of the growth of crops and vegetation, but also in connection with the branches of practical education in farm work which cannot be taught under the adverse circumstances which have existed during the last eight months.

The practical outdoor teaching during the year was devoted for the most part to horticulture (under a system of irrigation), dairying, cattle-breeding, pig-raising, bacon-curing, poultry-raising, beekeeping, carpentry, blacksmithing, clearing and fencing new land. I have during the year sought to meet the demand for "short courses," covering agriculture in general, or confined to special lines in agriculture and darying combined. This is designed to meet the wants of young men of mature age, some of whom have had a previous knowledge of farming. The practical work is supported by lectures on such subjects as breeding and feeding live stock, judging dairy stock, veterinary science, beekeeping, poultry-raising, farm bookkeeping,

carpentry, and blacksmithing. The dairy course is planned to meet the needs of those who intend to work their own dairy farm or undertake the management of cheese or butter factories or creameries. We have so far been very successful in training young men to be competent for such work. The drought has been felt the more severely by us, owing to the fact of our having had the hayshed, together with all our available fodder, destroyed by fire during the early part of the year. By this we lost 420 tons of valuable lucerne. wheaten, and oaten hay; also about 100 tons of straw, the whole valued at £3,200. This, it must be admitted, was a serious loss in such a trying season. The fodder destroyed was ample to keep the whole of the College stock for at least two years. The origin of the fire is a mystery, and likely to remain so; it was first observed in its earlier stages at about 10·30 on Sunday night, 17th March, but although all hands, including students, turned out and rendered all the assistance possible under the circumstances, nothing could be done further than saving some of the portable machinery. No persons could have expressed deeper regret at the loss than the students themselves, many of whom had worked long hours in order to have the fodder stored away before being damaged by the weather. In the early part of the drought 195 tons of ensilage were fed to animals kept on the place, including horses, cattle, sheep, and pigs. One hundred and seventy-five tons of this fodder had been carried over from the year 1900, *see* Annual Report, 1899-1900, which reads as follows :—"Ensilage—Owing to the amount of green fodder available this season we have not been called upon to open the silos, which contain 175 tons. There is also on hand a quantity of stock ensilage; this has been held over for two years, and still holds its condition as a sound fodder. Had it not been for the silos, this year the 175 tons of good fodder which they now contain would have gone to waste on the farm."

WORK DONE DURING THE YEAR.—There has been perfect harmony among the officers of the College, and every person has endeavoured to do his best, both for the students in attendance and the country at large. I have not lost sight of the fact that the College was organised, not only for the purpose of the education of students in attendance, but also for the purpose of establishing records of the results of the various experimental works carried out, and familiarising those interested with the same. At the same time, I am quite aware of the fact that the State Experimental Farm Stations were organised for the sole purpose of making investigations, carrying out experimental work on a large scale, and publishing and disseminating results. Such being the case, the College is not so much involved in experimental work as otherwise might be expected. I feel, however, justified in devoting as much time and labour to this work as the funds at our disposal will permit; at the same time guarding against losing sight of the obligations which we are under to students in attendance in regard to the general routine of farming education.

TEACHING STAFF.—During the year one change was made, the services of the horticulturist, Mr. C. T. Cole, having been dispensed with, and the garden work combined with that of the farm, Mr. Geo. Jackson (ex-student) acting as overseer. Under present arrangements, the results from the garden are all that could be desired. The whole of the staff report harmony, discipline (with a few exceptions), and progress in their respective branches.

NUMBER OF STUDENTS IN ATTENDANCE.—At the commencement of the year, July, 1901, 29 new students joined and 3 during the term, making a total of 68 for the first term. In the second term, 15 new students joined at the beginning and 1 later on, making a total for the term of 69. Thus we had 48 new students in all during the year; of these, 37 sat for entrance examination, the remainder, being bursars or adults, were exempt from examination. The average age of new students at the time of joining, during the period under review, was seventeen years and eight months. Three were under fifteen, 13 between fifteen and sixteen, 8 between sixteen and seventeen, 4 between seventeen and eighteen, 11 between eighteen and nineteen, 4 between nineteen and twenty, and 5 over twenty. About 50 per cent. of the new students passed their examination in a satisfactory manner, being up to the required standard; the remainder were very backward indeed. Mr. Pitt, who holds the entrance examination, reports that many students, through lack of education before joining the College, find a great deal of difficulty in mastering the indoor work, and are in consequence discouraged, and have to be forced to make an effort to improve themselves. Mr. Pitt further reports that fully half those who joined were deficient in knowledge of English (both spelling and composition), although their attainments in some cases were fairly high in other respects. Experience has shown that boys whose primary education has been neglected, and who have never acquired the habit of study, make poor progress in class work. Mr. Pitt, who teaches the subjects of English, arith-

metic, bookkeeping, mensuration, and practical surveying, has right along kept his classes well in hand, and has worked hard and faithfully for the advancement of students in the above subjects.

Apart from the permanent teaching staff, we have had the services of the following visiting lecturers:—Dr. MacDonald, first aid; Mr. Quinnell, veterinary science; Mr. Tryon, entomology; Mr. J. Bailey, botany; and Mr. Rainford, viticulture, practical. All of these have materially assisted in the educational work, and very many thanks are due to them for their efforts.

The following is a list of the students who left the College during the year:—

Name.	Attended at College.	Left College.	Present Occupation.
		1901.	
P. Cusack	Three years	June	Dairying (factory work)
B. Corser	"	December	Mixed farming
F. Walker	"	"	Horticulture
E. P. Noakes	"	June	Farming
T. Kidd	Two years	"	Mixed farming
W. Rutkin	One and a-half years	"	Grazing pursuits
E. Byrne	" "	December	Dairy farming
F. Harding	" "	"	"
H. Radford	" "	"	Unknown
T. Story	" "	"	Dairy farming
F. Molony	One year	June	
E. Watson	"	"	
H. Lamond	"	December	
W. North	"	"	
H. P. Molony	Nine months	June	
C. Rowland	"	December	
K. Molony	Three months	June	
J. Campbell	Six months	"	
R. Jones	Three months	"	
E. Carr (special)	Six months	December	Mixed farming
J. Proud "	"	"	Dairy work
H. Williams (special)	"	"	Dairying
G. Bond	"		
L. Noel	Three months		
W. Noel	"		
N. Sinclair	"		

Thus 10 students left in June, 1901; 16 left during or at the end of term ending December, 1901.

Four students remained three years, 1 two years, 5 one and a-half years, 4 one year, 2 nine months, 10 six months or less.

From the above list it may be observed that I do not keep a record of the occupations followed by students who remain one year or less at the College, except in the case of those who have taken a special course in one or two subjects; and not even then unless I feel satisfied that they are likely to do credit to the institution. It cannot be expected that a lad can do much credit to himself and his teachers with only a year's instruction. I have pointed out in each of my Annual Reports the absurdity of sending boys to the College for twelve months only, except in cases where a lad has had some previous training in agriculture. Such action is likely to do harm to the College, since it is claimed that if a lad has spent only a few weeks here he is a full-fledged "ex-student." The public must understand that no student can claim to have gone through the course of training with credit unless he can produce a College certificate or diploma certifying to the subjects in which he has qualified. We have no power to compel a boy to remain longer here than his parents desire, but I must say the policy adopted of sending lads here for a few months only is a very short-sighted one.

During the year the conduct of the students, with a few exceptions, has been all that could be desired, and progress generally has been good. Herewith is a grade sheet, from which it may be observed that several of the advanced students have been successful in gaining diplomas. C. Stumm, of Gympie, has been awarded the Principal's gold medal for the highest marks.

TERM GRADE SHEET—JUNE, 1902.

Division.	—	Farming, Theory.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Pigraising.	Book-keeping.	Elementary Science.	English.	Elementary Veterinary Science.	Animal Anatomy and Physiology.	Mensuration.	Physics.	Surveying.	Technical Drawing.			Mechanics.	Dairying, Practical.	Farming, Practical.	Gardening, Practical.	Conduct.	Diary.
Third.	F. Bowler	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	95	..	...	100	...
	F. Bray	78	...	51	74	84	89	96	...	...	...	60	...	..	...	...	...	...	...	75	90	90	...	100	31
	H. Dyne	72	...	...	66	69	50	90	...	...	...	91	...	...	...	...	...	...	...	70	50	80	...	50	24
	J. Evans	73	...	63	67	75	70	70	...	...	...	61	...	...	...	...	..	...	...	70	75	90	80	98	0
	M. Fox	...	...	...	72	78	...	...	...	...	...	80	...	...	...	...	...	...	...	80	...	...	90	100	45
Second.	H. Baker	49	...	5	38	41	41	64	40	...	...	25	...	...	...	39	...	...	...	65	70	80	72	35	68
	D. Deighton	62	...	15	26	42	44	55	50	...	...	31	...	...	...	83	...	...	...	...	64	70	75	76	87
	W. Eastgate	58	...	8	65	63	47	64	40	...	...	43	...	...	...	74	...	...	...	...	64	80	...	65	29
	D. Farmer	...	...	...	...	...	28	...	...	...	...	...	...	...	...	...	...	...	...	80	...	...	...	100	...
	C. Farmer	...	...	...	...	...	6	...	50	...	...	...	...	...	...	...	..	...	...	80	...	70	...	94	...
	H. Frederich	67	...	71	55	49	67	72	...	...	...	69	...	...	...	72	...	...	...	85	80	80	...	100	75
	L. McCready	74	...	...	62	56	...	...	40	...	...	100	...	...	...	69	...	...	...	70	76	80	...	92	26
	C. Stumm	89	...	76	83	86	82	96	...	...	...	81	...	...	...	...	...	...	...	80	87	90	...	100	53
	H. Schneider	41	...	32	31	23	43	54	...	...	...	56	...	...	...	19	...	...	...	70	62	70	78	80	0
	A. Thynne	78	...	32	27	33	50	44	...	...	...	63	...	...	...	...	...	...	...	70	70	75	...	64	28

First.	G. Abraham	66	85	71	75	...	69	25	78	...	...	...	69	89	...	...	...	...	...	60	70	45	71	96	75
	F. Boase	65	61	52	52	...	71	39	66	...	...	...	43	51	...	...	...	...	...	65	60	75	75	94	76
	A. Brown	60	29	21	34	...	56	...	52	...	...	...	10	35	...	...	...	...	...	65	58	50	66	92	75
	F. Butler	80	71	60	79	...	89	35	87	...	...	...	66	86	...	...	...	...	...	70	62	50	81	98	75
	F. Calcino	62	72	37	54	...	65	25	37	...	...	...	19	61	...	...	...	...	...	75	68	50	73	88	74
	W. Chataway	51	66	16	39	...	80	37	83	...	...	...	23	84	...	...	...	...	...	74	65	80	...	70	55
	S. Corser	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	65	60	70	...	45	25
	H. Cullinane	...	...	...	...	...	56	...	...	...	...	...	...	...	...	...	...	...	...	80	70	70	...	100	...
	J. H. Curtis	88	91	20	72	...	89	50	73	...	...	...	66	93	...	...	...	...	...	80	66	50	82	100	83
	A. Davies	58	82	78	61	...	68	40	78	...	...	...	47	85	...	...	...	...	...	...	52	55	65	92	70
	D. Dunlop	55	21	30	18	...	46	28	30	...	...	...	13	21	...	...	...	...	...	68	40	70	60	70	25
	V. Field	58	36	69	48	...	68	40	45	...	...	...	29	34	...	...	...	...	...	...	80	80	86	100	75
	A. Fountain	53	11	7	40	...	71	40	23	...	...	...	0	27	...	...	...	...	...	70	58	50	40	60	40
	L. Fudge	60	84	67	55	...	56	35	77	...	...	...	48	93	...	...	...	...	...	70	68	65	75	90	82
	T. Gordon	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	75	70	...	100	...
	M. Marley	80	...	...	52	...	68	45	...	...	...	...	36	...	...	...	...	...	...	80	70	60	87	100	27
	D. McDonald	33	36	10	19	...	40	36	46	...	...	...	8	17	...	...	...	...	...	70	59	60	68	64	61
	G. Myers	54	30	16	21	...	59	40	40	...	...	...	6	25	...	...	...	...	...	70	64	45	66	94	67
	B. Noakes	65	45	0	48	...	45	30	73	...	...	...	15	42	...	...	...	...	...	70	70	80	87	94	59
	H. Noyes	51	6	15	24	...	45	...	77	...	...	...	18	9	...	...	...	...	...	84	67	75	...	30	56
	J. Nuttall	91	86	32	49	...	84	...	72	...	...	...	29	76	...	...	...	...	...	70	54	35	55	100	82
	F. O'Connor	70	31	86	58	...	84	...	60	...	...	...	46	33	...	...	...	...	...	70	53	75	60	100	79
	A. O'Keeffe	53	43	45	15	...	66	44	57	...	...	...	8	33	...	...	...	...	...	...	54	55	75	100	71
	P. C. Price	58	64	32	44	...	72	30	65	...	...	...	23	39	...	...	...	...	...	68	73	65	77	54	26
	H. M. Prior	...	...	...	13	29	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	40	90	...
	J. Purcell	68	82	54	42	...	65	40	93	...	...	...	46	70	...	...	...	...	...	70	52	45	...	100	72
	L. Robinson	45	6	7	18	...	60	30	3	...	...	...	6	14	...	...	...	...	...	70	60	70	...	90	65
	R. Robinson	55	31	27	31	...	70	...	61	...	...	...	29	25	...	...	...	...	...	...	76	80	...	76	47
	A. Ryan	...	43	...	35	...	...	...	47	...	...	...	12	55	...	...	...	...	...	65	40	60	...	30	47
	M. Shield	93	79	73	56	...	73	30	64	...	...	...	53	79	...	...	...	...	...	74	67	65	79	96	26
	D. Shine	50	58	33	25	...	45	40	50	...	...	...	33	63	...	...	...	...	...	70	48	45	45	80	76
	S. Smith	56	54	15	26	...	61	25	40	...	...	...	10	48	...	...	...	...	...	65	61	80	63	100	50
	F. Stumm	80	30	34	60	...	88	60	60	...	...	...	40	36	...	...	...	...	...	70	78	85	...	98	44
	L. Walters	...	40	...	21	...	...	...	61	...	...	...	0	21	...	...	...	...	...	70	57	50	63	98	41
	A. Webster	65	30	15	28	...	62	37	49	...	...	...	8	53	...	...	...	...	...	...	45	65	74	50	48
	L. Williams	80	67	30	74	...	82	38	88	...	...	...	56	87	...	...	...	...	...	70	62	50	82	100	57
	H. Wolfe	64	66	28	33	...	63	...	47	...	...	...	27	64	...	...	...	...	...	70	45	60	...	64	72
	G. Thaler	...	...	...	65	42	...	...	...	...	...	...	62	...	...	...	...	...	...	...	65	85	86	100	...

TERM GRADE SHEET—JUNE, 1902—*continued.*

Division.	—	Farming, Theory.	Arithmetic.	Botany.	Chemistry, Theory.	Chemistry, Practical.	Dairying, Theory.	Pigraising.	Book-keeping.	Elementary Science.	English.	Elementary Veterinary Science.	Animal Anatomy and Physiology.	Mensuration.	Physics.	Surveying.	Technical Drawing.			Mechanics.	Dairying, Practical.	Farming, Practical.	Gardening, Practical.	Conduct.	Diary.
Preparatory.	E. Alcock	...	62	...	...	...	...	...	...	36	27	...	...	...	...	...	...	...	...	65	56	55	76	58	45
	L. Alford	...	66	...	...	...	...	...	...	25	41	...	...	...	...	...	...	...	...	70	50	55	73	92	63
	C. Alford	...	8	...	...	...	...	...	...	30	64	...	...	...	...	...	...	...	...	...	55	70	85	90	72
	L. Bode	...	1	...	...	...	...	...	...	12	25	...	...	...	...	...	...	...	...	70	58	65	83	100	61
	F. Cockerill	...	38	...	...	...	...	...	...	39	50	...	...	...	...	...	...	...	...	68	51	50	53	74	0
	A. Cran	...	57	...	...	...	...	...	...	36	64	...	...	...	...	...	...	...	...	65	63	65	66	82	26
	J. Dalrymple	...	54	...	...	...	...	...	...	61	59	...	...	...	...	...	...	...	...	68	55	70	71	72	58
	H. Dalrymple	...	39	...	...	...	...	...	...	...	57	...	...	...	...	...	...	...	...	...	40	40	72	90	43
	J. Devereux	...	5	...	...	...	...	...	...	20	38	...	...	...	...	...	...	...	...	...	53	50	80	30	61
	W. Donaldson	...	22	...	...	...	...	...	...	60	79	...	...	...	...	...	...	...	...	70	60	60	80	100	76
	J. Gleeson	...	62	...	...	...	...	...	...	53	57	...	...	...	...	...	...	...	...	70	59	65	80	100	51
	W. Mahony	...	41	...	...	...	...	...	...	41	60	...	...	...	...	...	...	...	...	65	52	55	55	82	71
	P. McLean	...	79	...	...	...	...	...	...	55	35	...	...	...	...	...	...	...	...	70	59	40	64	80	69
	C. O'Connell	...	15	...	...	...	...	...	...	23	46	...	...	...	...	...	...	...	...	70	57	70	58	45	64
	E. Poulsen	...	80	...	...	...	...	...	...	75	59	...	...	...	...	...	...	...	...	...	54	60	54	96	76
	E. von Stieglitz	...	15	...	...	...	...	...	...	20	12	...	...	...	...	...	...	...	...	70	50	70	71	100	48

CHEMISTRY.—The Science Master, Mr. Gurney, who devotes the whole of his time to this subject, reports that the theoretical work for the year included the further consideration of the mechanical and chemical conditions of soil, the use and composition of artificial manures, the plant-food requirements of the different crops, the composition and consideration of food values of different fodders, fermentation and chemical changes which take place in the production of ensilage, and the chemical nature of sprays, poisons, &c. The first-year students and preparatory class were confined to elementary work. The laboratory work dealt largely with scientific principles that were in actual adaptation on the College farm. The third-year students were taught the different methods for the quantitative analysis of bonedust and other manures, soils, milk, butter, cheese, &c.; also, how to detect the different preservatives used in milk and butter. The conduct, attention, and progress of the students were good.

FARM.—In this department, Mr. Watt (farm foreman) and his assistant, Mr. Jordan, have done some good honest work, and, in consequence of the dry weather during the latter part of the year, they were fully taxed to keep pace with the work in hand, their hours of duty being long—from 5·30 a.m. to 5·30 p.m. As previously stated, the rainfall for the year was exceedingly low, the total being 15 inches, as will be seen by a reference to the rainfall table published every month in the *Agricultural Journal.* The dry season spoiled all hope of showing good results in our experimental work, and, from an educational point of view, we can only claim having taught the actual methods of cultivation, preparation of seed, application of manures, cultivation of such crops as grew, and similar work.

The greater part of the cultivation land has been surveyed and laid off in paddocks and five-acre plots for experimental purposes, all numbered, and in such a manner that no error can be made. A record is kept by the secretary of all crops planted. This shows the method of cultivation, the cost of ploughing, harrowing, and sowing, from whom seed was procured, germination of seeds before planting, method of planting, cost of harvesting, and marketing crop, &c. The students have had a good training in all-round practical work, including the working of all the machinery in use on the place, steam engines, pumps, reapers and binders, chaffcutters, mowing machines, single, double, and three-furrow ploughs. We have been successful in training a boy, B. Noakes, to win the ploughing match in the youths' class, among a large field of competitors. This is the fourth occasion upon which we have been successful in winning at the Lockyer annual match. A keen interest has been taken in the practical work on the farm, and much valuable assistance in carrying on this work has been rendered by many of the advanced students, who have been careful and watchful in every branch of the work, and of whom the College has every reason to be proud. I feel pleased to be able to say that excellent progress has been made in all branches of practical farm work. The following is a list and particulars of crops planted and harvested during the year, together with yields and results:—

Standing Crops, 30th June, 1901.

	A.	R.	P.
Paspalum dilatatum	8	3	17
Beans (experimental)	0	0	30
Sorghums	11	0	35
Potatoes	11	0	25
Potatoes (experimental)	0	0	10
Sundry root crops (experimental) ...	0	0	10
Lucerne	76	0	24
Maize	7	3	29
Maize and Pumpkins	31	3	4
Swede Turnips	2	0	3
Carrots	1	2	10
Barley	30	0	23
Oats	6	1	8
Wheat	32	2	11
Millets	1	1	30
Mangolds	0	1	4
Amber Cane	1	0	34
Orchard	5	1	21
Vines	2	2	17
Vegetables	2	0	0
Total area under crop	232	3	25
Fallow	39	0	3
Total area cultivated	271	3	28

Crops Removed, July, 1901—*June,* 1902.

A.	R.	P.		Yield.
17	3	21	Potatoes	15 tons.
*34	1	24	Maize.	
*36	3	4	Maize and Pumpkins	109 tons (pumpkins).
36	0	35	Wheat cut for hay	117 tons.
30	0	23	Barley	245 bus. Cape, 754 bus. malting.
16	1	13	Oats cut for hay ...	52 tons.
11	0	35	Sorghum	220 bus. Kafir Corn, 12 bus. Giant Sorghum
1	1	30	Millets	30
1	0	34	Amber Cane ...	5 tons green fodder, 2 bus. seed.
2	0	3	Swede Turnips ...	51 tons 3 cwt.
1	2	10	Carrots	17 tons 1 cwt.
1	1	36	Mangolds ...	14 tons 15 cwt.
2	0	5	Beetroot	2 tons 15 cwt.
5	0	0	Pumpkins ...	Included in yield given above.
197	2	33		

* Of the area under maize, 71 acres 0 roods 28 perches, 20 acres were harvested for a yield of 500 bushels; in the case of the remainder, the cobs have failed to fill owing to the dry weather, it was cut for fodder for stock.

Crops Failed, July, 1901—June, 1902.

A.	R.	P.	
8	2	15	Paspalum dilatatum.
15	0	8	Potatoes.
4	3	22	Barley.
1	0	0	Sweet Potatoes.
5	0	0	Panicum.
34	2	5	

Fallow Crops standing, or sown, 30th June, 1902.

Farm Paddock.

Plot.	A.	R.	P.	
1	5	0	0	Cowpea
2	5	0	0	Fallow
3	5	0	0	Rye (lately sown)
4	5	0	0	Potatoes
5	5	0	0	Cape Barley (lately sown)
6	5	0	0	Fallow
7	5	0	0	Wheat (lately sown)
8	5	0	0	Kafir Corn
9	5	0	0	Maize and Pumpkins
10	5	0	0	Cape Barley (lately sown)
11	15	1	30	Lucerne (lately sown)
12	8	3	17	Lucerne (lately sown)
13	39	2	13	Lucerne
14	1	2	21	Fallow
15	0	0	23	Paspalum dilatatum
	115	2	24	

Bull Paddock.

1	8	2	34	Paspalum dilatatum
2	26	3	38	Fallow
	35	2	32	

Garden Paddock.

1	1	2	31	Fallow
2	18	1	35	Lucerne
3	4	0	31	Wheat
4	0	2	17	Vines
5	2	3	11	Orchard
6	10	0	18	Vegetables and fallow
7	1	0	3	Cape Barley
	38	3	26	

5 acres 3 roods 22 perches under lucerne last year, ploughed and replanted with other crops.

Creek Paddock No. 1.

Plot.	A.	R.	P.	
1	14	0	34	Algerian Oats (lately planted)
2	4	2	38	Cape Barley (lately planted)
3	19	2	34	Malting Barley (lately planted)
	38	2	26	

Creek Paddock No. 2.

1	12	0	24	Lucerne
2	17	1	6	Fallow
	29	2	0	

Creek Paddock No. 3.

1	30	1	6	Fallow, recently cleared and ploughed

Calf Paddock.

1	4	3	22	Cape Barley (lately sown)
2	4	0	8	Fallow
	8	3	30	

Sheep Paddock.

1	15	1	38	Algerian Oats (lately sown)

Cultivation on Hill.

1	2	2	10	Orchard
2	2	0	0	Vineyard
	4	2	10	

Summary of Crops, 30th June, 1902.

	A.	R.	P.
Orchard	5	1	21
Vineyard	2	2	17
Vegetables	5	0	18
Paspalum dilatatum...	8	3	17
Lucerne	94	2	9
Potatoes	5	0	0
Wheat	9	0	31
Barley	40	1	17
Oats	29	2	32
Cowpea	5	0	0
Kafir Corn	5	0	0
Rye	5	0	0
Under crop	220	3	2
Fallow	96	3	30
Total area cultivated	317	2	32

LUCERNE.—During the year we had three cuttings from the 70 acres under this crop, the average yield being 28 cwt. of hay per acre. This, considering the season, was a good return. The spring-tooth cultivator was applied to the old lucerne land, and had a good effect on the growth of the crop. The total yield of lucerne for the year was 294 tons from 70 acres.

WHEAT.—The whole of this crop, owing to the appearance of rust in the early part of the season, was cut and converted into hay. The Belatourka variety was slightly affected only. The crop was harvested with the reaper and binder. The quality of the hay was first-class, being well and carefully saved. The yield from the 36 acres was 117 tons, the Belatourka producing as much as 4 tons per acre.

STUD WHEATS.—Only eight varieties were harvested, viz. :—Messogan, Bearded Club, Egyptian A2, Sicilian Bart, Forella, Cretan, Young's Bearded, Mica. These varieties were all hard-bearded wheats, and appear to withstand dry weather fairly well. All other lots failed to produce grain, some failing in the earing-out stage.

OATS.—Sixteen acres of Algerian oats were harvested for a yield of 52 tons, being an average of 3 tons 5 cwt. per acre. The quality of this crop was excellent, the hay being equal to anything produced in the Southern States. After having experimented with the various kinds of oats, I have come to the conclusion that the Algerian do best in our soils, the straw being fine and suitable for manger hay. In the near future, this crop, when its value as a fodder is more clearly understood, will be largely grown in Queensland, not only because of its value as a fodder, but because of the small cost of production.

Rye.—This crop does remarkably well here, and in its early stage of growth makes a good green fodder. Five acres from last year's crop returned 15 tons. Some of this was used as thatch; the rest was mixed with lucerne hay for chaffing purposes.

Malting Barley.—Twenty-nine acres of malting barley (Hallett's) were harvested for a yield of 754 bushels, being an average of 26 bushels per acre. Considering the dry season, this may be looked upon as a satisfactory yield. The quality of the barley was first-class, and it has been found to be one of the most profitable crops grown at the College. A great portion of the crop was fed to pigs and horses; the balance was sold for seed or kept for planting here.

Cape Barley.—From 9 acres harvested, the result was 245 bushels, an average of 27 bushels per acre. This is another most profitable crop to the farmer, especially in the form of grain for stock-feeding. I have also found it to surpass all other crops for the purpose of ensilage, and it may be grown and handled at a small cost.

Sorghums.—Kafir corn, 6½ acres yielded 220 bushels, a very high yield indeed. Owing to the difficulty in handling this crop, it may be said that at least 60 bushels could not be gathered; this was afterwards eaten by pigs and cows, which had been turned upon the land to eat up what was left. This crop is, I consider, a most valuable one. Pigs fatten rapidly upon the seed, fowls do well on it. It may also be used to advantage as a green fodder. Giant sorghum yielded 12 bushels per acre. Amber cane (1½ acres), 2 bushels were saved for seed, and 5 tons of green fodder fed to stock.

Cowpea.—A small area of this was planted. A portion of it was threshed and the seed saved for future planting, and the balance converted into ensilage.

Maize.—This crop, with the exception of what was planted early, failed to produce grain, and was fed to stock. Twenty varieties were planted in experimental plots. All of these failed to produce grain, and were also fed in a green state to stock. The experiments in connection with this crop will be found under the heading of "Experiments" in a subsequent page of this report.

Root Crops.—The results from these crops, with the exception of Swedes and carrots, were very poor. Particulars will be found under the heading of "Crops Harvested" and "Experimental Work." It is to be regretted that all of the seventy-two varieties of potatoes, planted early in the season, were lost.

Grasses and Clovers.—Although we had the ground well prepared for planting varieties of these crops, we were unable to do so owing to the want of moisture. Nine acres of *Paspalum dilatatum* grass were planted, and even this, owing to the extreme dryness of the soil, did not survive. However, the 9 acres of this grass, planted some time ago, have done remarkably well, having remained green a few inches above the surface the whole season; it was, moreover, continually grazed down by horses and cattle. One crop was allowed to go to seed, and grew to a height of 5 feet 6 inches. After saving the seed the grass made excellent hay, the yield being 17 cwt. per acre. We now hold orders for upwards of 6,000 plants from various parts of Queensland. These will be sent away as soon as the drought breaks up and conditions are favourable for transplanting.

The following are particulars of experiments carried out in connection with the farm crop:—

Manurial Experiments—Mangel-wurtzel.

Eleven plots of 16 perches each, separated by a space of 6 feet, were treated. The land was first ploughed to a depth of 12 inches, 4 cwt. of unslaked lime was placed on nine plots and allowed to remain for twelve days, when it was again ploughed, harrowed, and rolled, and the undermentioned manures applied —

No.	Superphosphate.	Pot. Sulph.	Amm. Sulph.	Aust. Pot.	Kainit.
2	18 lb.	8 lb.	...	...	...
3	18 lb.	...	5 lb.	...	...
4	...	18 lb.	5 lb.	...	...
5	18 lb.	8 lb.	5 lb.	...	...
6	9 lb.	4 lb.	...	...	...
7	36 lb.	16 lb.	10 lb.	...	...
8	18 lb.	8 lb.	10 lb.	...	...
9	18 lb.	...	5 lb.	16 lb.	...
10	...	...	...	...	36 lb.
11	No manure.				
1	Farmyard manure, 7 tons.				

The yields from the various plots were as follow:—

Plot	Tons	cwt.	qr.	lb.	Plot	Tons	cwt.	qr.	lb.
2	1	0	0	25	8	0	19	1	0
3	0	17	1	23	9	0	17	0	25
4	1	0	1	13	10	0	14	0	11
5	0	18	2	3	11	0	13	3	18
6	0	15	3	15	1	1	2	2	25
7	0	15	3	22					

From the above, it may be observed that the highest yield was obtained from Plot 1, treated with farmyard manure. I wish to draw attention to the fact that, owing to the dry weather, the crop was planted out of season, during second week in August, and the low yield may be accounted for by the prevailing dry season. The highest average per acre was 11 tons 7 cwt. 26 lb.

Five and three-quarters acres of old lucerne land were ploughed, harrowed, twice rolled, and planted with potatoes. Different methods in planting were adopted, some being ploughed in as a comparison with drilling. Manures were used on the various plots as follow:—

	Per Acre.		Per Acre.
1. Wood ashes	10 cwt.	7. Superphosphate ...	1 cwt.
2. Australian potash ...	3 „	Ammonia sulphate ...	½ „
3. Kainit	6 „	Australian potash ...	1½ „
4. Superphosphate	2 „	8. Superphosphate ...	2 „
5. Ammonia sulphate ...	1 „	Ammonia sulphate ...	1 „
6. Australian potash ...	3 „	9. Kainit	3 „
Ammonia sulphate ...	1 „	10. No manure.	

Each plot contained 16 perches.

The manure was placed in the drills, and a little soil put upon it before planting the potatoes. Each plot contained 11 drills, 2 chains long.

The yield from No.		1	Plot was	at the rate of	1,900 lb.	per acre.
„	„	2	„	„	2,200	„
„	„	3	„	„	1,700	„
„	„	4	„	„	2,400	„
„	„	5	„	„	2,100	„
„	„	6	„	„	1,800	„
„	„	7	„	„	2,900	„
„	„	8	„	„	1,900	„
„	„	9	„	„	1,800	„
„	„	10	„	„	1,600	„

Five acres of maize were planted in Plot No. 9, 4 acres of which were treated with fertilisers, and the fifth, as a comparison, was unmanured. The following festilisers were used:—

Per acre—1. Ammonia sulphate, 1 cwt.; Australian potash, 2 cwt.; superphosphate, 2 cwt.
„ 2. Australian potash, 1 cwt.
„ 3. Australian potash, 2 cwt.; superphosphate, 2 cwt.
„ 4. Ammonia sulphate, 1 cwt.; superphosphate, 2 cwt.
„ 5. Unmanured.

The drills in which the maize was planted were ploughed 8 inches deep, when some of the soil was allowed to fall back into the drill; the fertilisers were then placed in the drill, the maize planted, and covered by means of harrows.

Owing to the dry season the crop failed to produce grain, and was therefore fed to live stock in the form of green fodder.

A list of stud wheats planted in July, 1901, was given in the monthly report in the *Queensland Agricultural Journal.*

Eight varieties were harvested. *See* preceding part of this report.

ROADMAKING.—During the year arrangements were made with the Tarampa Divisional Board for the forming of sixty-eight chains of the road known as the Rosewood and Gatton road. This work was carried out partly for educational purposes, and partly owing to the fact that during the wet season this road is impassable with heavy loads. The work was carried out on the following conditions—viz.: The formation to be done by the College, the Tarampa Board to gravel and keep the road in repair. This agreement has been fulfilled so far as the College is concerned, but up to the present time nothing beyond clearing off the timber has

been done by the board. The work was carried out with the aid of the American Champion Roadmaking Machine, which did excellent work. The cost of formation was increased by the fact that there were so many roots left in the ground, which should have been removed when the road was being cleared, that our plough was broken on numerous occasions, and men had to be told off to remove these obstructions. The actual cost of ploughing and forming the sixty-eight chains was £26 10s. made up as follows:—Two men, twenty days at 5s, per day, £10; one student, twelve days at 2s. 6d. per day, £1 10s.; six horses, twenty days at 2s. 6d. per day, £15. This cost is about 50 per cent. below the ordinary contract price for such work.

Vegetable Garden.—During the year a great deal of good work has been done in this department. Mr. Jackson, the overseer, was kept constantly employed, and, under unfavourable circumstances in the early part of the year, has worked the place up to a very creditable condition. When I found the dry season was likely to continue, I established a scheme of irrigation whereby the whole vegetable garden (10 acres) could be irrigated in a few days. The scheme has been carried out at a very small cost, the total outlay being £14 or £15. The steam boiler and pump, which are being used for our general supply, with an additional 100 feet of 4-inch piping, are used for the work. The capacity of the pump is about 5,000 gallons per hour. By this means we have been able to keep up a regular supply of vegetables for our own use, and also to keep many of our surrounding farmers and townships in the district. The pump, when not required for garden use, is used for irrigating a portion of the lucerne land. This, in a small way, has been a thorough success. A deep interest has been shown by the students in garden work, especially since we have been able to produce vegetables at a time when there are few others in the district—with the exception of Chinamen—who are growing them. Much interest has been manifested by the numerous visitors in this branch of college work.

Orchard.—The two orchards, one on the Lockyer Creek and the new one near the Principal's residence, have been kept in good order during the year. The pruning of the fruit trees did not receive early attention owing to the fact that Mr. Cole, the late horticulturist, left for Victoria before the work was completed. The remainder of the work was carried out by students Fox and Frederich, who had previously received instruction from Mr. Voller, and had been under Mr. Cole for some considerable time. However, as the trees were too far advanced before the whole of the work could be completed, I caused six peach trees to be left unpruned. The peaches, plums, apricots, and figs yielded very fine crops, especially the latter. The flying foxes were very destructive, and also worms in the case of the peaches. The mandarin trees bore a good heavy crop, but owing to the dry weather the fruit did not reach maturity. All the young trees planted near the Principal's house are making rapid growth. Although fruit culture here is not carried out on a large scale, the work is sufficient to give the students a good knowledge of the business.

Vineyards.—The work in this department is carried out under the direction of Mr. Rainford, Viticulturist to the Department of Agriculture, who pays periodical visits to the College, and gives practical demonstrations in pruning and cultivation for the benefit of the students who take part in the work.

The vines on the creek, where trellising had been done, returned a good crop of grapes, while those near the Principal's house were not worth the labour of harvesting. The vineyards have been kept in a perfect state of cultivation; this entails a good deal of work, most of which is done by students.

Dairy.—Mr. Chas. McGrath, who is in charge of the department, has worked hard to make the dairy a success, not only from a financial point of view, but also in connection with the educational part of the work. Mr. McGrath is a very hard-working officer, his hours being from 5·30 a.m. to 6·30 p.m., Sundays included. He possesses the power of holding well in hand such students as are assigned to him, and the results are best shown in the half-yearly examinations, which are set and held by the writer. I am therefore justified in saying that good results have accrued from his labours. In reviewing the work of the period covered by this report, we are kept mindful of the unfavourable climatic conditions which have prevailed throughout the greater portion of the year, and which have restricted in no small degree the expansion of the operations of this department. The provision made for the winter of 1901 was such as to provide more fodder than was required by the dairy stock during that period, the green fodder not used at the termination of the previous winter having been saved as hay. The favourable conditions existing for a few months of early spring enabled an ample supply of fodder to be saved for the use of the dairy herd; this, however, we were unfortunate enough to lose by fire. The contents of two silos were fed to bulls, dry stock, sheep, and pigs. Owing to the parched-up condition of the natural grasses

for months past, the milking herd has been depastured on various cultivated plots, chiefly lucerne and *Paspalum dilatatum.* They also had fed to them a quantity of maize which, as stated, owing to the want of rain, would not yield grain. A few patches of sorghum also were found useful in providing fodder. During the present winter months, the cows in milk, stud bulls, and young pedigree stock are being fed on chaffed wheaten straw mixed with molasses. It has been found that the stock eat the food with more relish, and do better on it when the chaff is steamed. The milk cows in full milk and the stud bulls are either rugged at night or housed during the winter. The first of the College bred stock are now coming into milk; but it is too early to form any idea of the relative values of the various crosses represented. This season is a hard one on stock; but, nevertheless, some of the heifers are giving encouraging results. The demand for purebred stock is well maintained, and would, no doubt, be much greater had the season been more favourable to agriculturists. General dairy factory work was carried out, and proved of great interest and benefit to students attending. Lectures were delivered, by both Mr. McGrath and myself, on modern dairy practices. The refrigerator and plant worked satisfactorily during the year; but the want of refrigeration in the new cheeseroom was much felt. A Melotte hand cream separator has been loaned to the institution, and serves to familiarise the students with the use of the different machines. It is as yet, however, only temporarily placed in the factory. The daily records of the milk yields of the individual cows are published monthly in the *Agricultural Journal*, and that it is of interest to farmers is realised by the receipt of inquiries from intending purchasers of dairy stock as to whether we have for sale the progeny of one or other of best cows as shown by published results. Experiments were conducted in pig-feeding and milk separation, results of which are forwarded herewith.

The quantity of milk treated during the year was 19,988 gallons; of this 3,157 gallons were converted into 3,634 lb. of cheese, and 16,831 gallons returned 7,102 lb. of butter; 4,768 gallons of milk and 5,491 lb. of butter were supplied to the dining-hall.

The following are the particulars of the various breeds of dairy cattle at the College on 30th June, 1902:—

Guernseys—1 stud bull, 1 stud cow, 1 heifer.
Holsteins—1 stud bull, 1 young bull (two years), 2 females.
Jerseys—1 stud bull, 2 young bulls, 6 aged cows, 16 females.
Ayrshires—1 stud bull, 10 young bulls, 11 aged cows, 26 young females.
South Coast—5 females.
Shorthorns—1 stud bull, 15 young bulls, 25 females.
Mixed—21 males, 101 females (mixed ages).

The Jersey stud bull, "Lord Harry," has been sent to Biggenden Experiment Farm.

TOTAL YIELDS OF MILK AND BUTTER DURING THE YEAR.

Name of Cow.	Breed.	Yield.	Commercial Butter.	Date of Calving.	Date Dried Off.	Remarks.
		Lb.	Lb.			
Lavina ...	Ayrshire	7,430	318·42	11 Sept., 1901	27 May, 1902	
Linnet ...	"	8,549	345·63	7 May "	30 April "	
Blink	"	7,567	315·26	21 Feb. "	27 Dec., 1901	
Ruth	"	4,824	197·13	8 Oct., 1900	8 Sept. "	With first calf
Annie Laurie	"	6,049	250·84	30 May, 1901	27 Jan., 1902	
Leesome ...	"	9,389	392·93	1 Sept., 1900	25 Sept., 1901	
Ream Routhie	"	5,007	211·42	20 " 1901	15 June, 1902	
Isabelle ...	"	6,904	290·28	7 July "	30 July "	
Ream	"	6,451	270·46	24 " 1900	20 June, 1901	
Stumpy ...	Jersey	9,502	467·10	29 Aug. "	20 Oct. "	
Effie	"	5,239	261·81	6 Jan., 1901	20 Sept. "	
Jersey Belle ...	"	5,547	316·73	21 May, 1900	18 May "	
Spec	"	3,779	165·32	26 Aug. "	10 June "	With first calf
Carrie ...	"	4,868	244·99	18 " "	5 July "	" "
Bashful ...	"	3,381	181·66	2 Nov. "	10 June "	" "
Beatrice ...	"	3,530	182·89	3 Sept. "	4 May "	
Damsel ...	Holstein	7,948	288·69	19 Jan., 1901	14 Nov. "	With first calf
Fancy... ...	South Coast ...	9,094	390·78	21 Mar. "	30 May, 1902	
May	Shorthorn ...	4,697	195·85	20 May "	10 Feb. "	
Louisa ...	"	8,275	340·52	6 April "	20 April "	
Kit	"	4,696	199·25	28 Sept. "	5 " "	

TOTAL YIELDS OF MILK AND BUTTER DURING THE YEAR—*continued.*

Name of Cow.	Breed.	Yield.	Commercial Butter.	Date of Calving.	Date Dried Off.	Remarks.
		Lb.	Lb.			
Spot	Shorthorn ...	4,665	196·19	11 Sept., 1901	10 May, 1902	
Violet... ...	,, ...	5,383	221·73	9 Oct. ,,	30 June ,,	
Stranger ...	,, ...	7,954	328·19	7 July, 1900	25 July, 1901	
Redmond ...	,, ...	5,814	242·86	12 Sept. ,,	12 June ,,	
Frizzy ...	,, ...	5,717	233·34	23 Aug. ,,	1 July ,,	
Lucy	Grade Shorthorn	6,090	250·36	29 Sept. ,,	1 ,, ,,	
Russet ...	,, ,, ...	4,290	179·84	27 Oct. ,,	2 ,, ,,	
Eva	,, ,, ...	5,286	222·13	18 May, 1901	22 Mar., 1902	
Leopard ...	,, ,, ...	4,904	198·24	20 Sept., 1900	10 July, 1901	
Laurel ...	,, ,, ...	5,888	243·40	10 ,, 1901	1 ,, ,,	
Empress ...	,, ,, ...	4,412	180·3	20 Nov. ,,	25 June, 1902	
Rosella ...	,, ,, ...	7,741	325·42	10 Sept. ,,	12 Sept., 1901	
Pansy... ...	,, Jersey ...	4,837	205·97	4 Dec., 1900	12 ,, ,,	With first calf
Pet	,, ,, ...	4,014	163·49	14 Aug., 1901	5 May, 1902	

The comparative skimming qualities of Holstein, Ayrshire, and Jersey milk were published in the June issue of the *Queensland Agricultural Journal*, Vol. X., page 446.

PIGGERY.—A largely increased output was expected in the early part of the year, but the unfavourable season prevented these expectations being realised, and a large number of pigs were disposed of as weaners which would otherwise have been fattened for factory, market, or curing purposes here. We disposed of 146 head of Improved Berkshire pigs for breeding purposes, 66 being stud boars, and 80 sows; also 16 Middle Yorkshire boars and 8 sows; 1 small Yorkshire boar and 4 sows; and 13 Tamworth sows. We killed, for curing and use of dining-hall, 24 head, and sold 61 head of mixed pigs, besides 29 fat pigs. We added to the pedigree stock by the purchase from Mr. W. R. Robinson, of Toowoomba, of 1 Improved Berkshire boar, from imported stock; and 9 Improved Berkshire breeding sows. The following crosses were produced—Tamworth-Berkshire, Middle-Yorkshire-Berkshire, Large-Yorkshire-Berkshire. The Middle-Yorkshire-Berkshire pigs are found to be good fast growers. The following are the particulars of pigs on hand 30th July, 1902:—

Improved Berkshire—3 stud boars, 28 breeding sows, 38 young boars, 50 young sows.
Middle Yorkshire—2 stud boars, 2 sows, 14 young boars 11 young sows.
Large Yorkshire—1 stud boar, 1 sow, 3 young boars, 2 young sows.
Small Yorkshires—1 stud boar, 2 sows, 6 young boars, 2 young sows.
Tamworths—2 stud boars, 2 sows, 9 young boars, 5 young sows.
Crossbreds—Yorkshire-Middle-Berkshire, 14 head young stock.
Mixed pigs—11 head.

Several experiments in pig-feeding have been made, and the results were duly published in the *Queensland Agricultural Journal*, Vol. VI., pages 365, 472.

SHEEP—A few sheep are kept on the place for educational purposes, and also for cross-breeding experiments. The crosses are: The Romney Marsh ram with the merino ewe, and the Shropshire ram with the merino ewe. These animals act as scavengers on the farm, orchard, and vineyard, and, for this purpose, are found to be the most useful animals on the place. As far as our experiments have gone, the Shropshire ram and merino cross have shown the best results, the progeny being quick growers and easily fattened. The dry season has, however, detracted from anticipated results. Sixty-three head of crossbred lambs have been sold, and 72 head killed for the dining-hall. Number of sheep, 30th June, 1902:—1 Romney Marsh ram, 2 Shropshire rams, 218 ewes.

POULTRY.—This branch of College work, together with bee-keeping, is carried out under the care of Mr. Hindes, who is a most painstaking officer. The following are the varieties of fowls kept here:—Light Brahmas, Black and Buff Orpingtons, White Wyandottes, Silver Laced Wyandottes, Black Langshans, Brown Leghorns, White Leghorns, Old English Game. The increase from the various hatchings was good. We started with a low-priced lot of birds, and cannot therefore be expected, for a time at least, to produce birds with all the characteristics of those to be seen gaining prizes at large shows.

The selection of our poultry was made for the purpose of producing a "utility" bird with a special view for the export trade. It is not for me to go into details in

connection with the different birds: reports will be published from time to time in the *Agricultural Journal*. The most improved methods of breeding, feeding, working of incubator, and caponising have been imparted to the students.

BEES.—Mr. Hindes reports that he has extracted ½-ton of honey from 15 hives: this he considers a good return. Students have received instruction in the general working and handling of bees, and culture in all its branches.

MECHANICAL DEPARTMENT—*Carpentry.*—A portion of the chemical laboratory was converted into a dormitory, giving additional accommodation for 18 students. Forty-six forms and one table were made for the dining-hall, also new desks, &c., for the lecture-room. Sixteen new poultry-houses, together with yards, were constructed. Additions to piggery, including yards and sheds, were completed. General repairs to gates and buildings were carried out. The haysheds, garden, stable, men's quarters, calf house, verandas, posts, and railings on dormitories and dining-hall were painted. A large number of pig crates were made, and a great many small jobs too numerous to mention were carried out.

Blacksmithing.—Steam boilers, engines, pumps, &c., have been painted, and have had a thorough overhaul. The water supply has been laid on to the poultry yards. Troughs for an extra supply to stock were made and erected. The usual horse-shoeing, repairing of implements, &c., have been carried out. Many of the second-year students are now quite competent to shoe horses and repair farm implements as well as many a village blacksmith. Mr. W. Doughty, who is in charge of the carpentry work, reports good progress, as also does Mr. A. Dennis, who is in charge of the blacksmithing. Nearly all the students evince a strong desire to acquire knowledge in the work of this department.

Improvements.—During the year 86 acres of land have been grubbed, stumped, and cleared; 45 acres of this have been ploughed, 15 of which have been planted with oats, the remainder being fallow; 34 chains of fencing have been erected, with 2 barbed and 1 plain wire, the posts being substantial, and 12 feet apart.

DINING-HALL.—Mr. White, chief steward, who is in charge of this establishment, reports that good order and conduct have, with a few exceptions, been maintained. Punctuality in this connection, as is the case all round, is the order of the day. The stores, including meat and bread, have been quite up to the standard, and there have been no grounds for complaint in any direction. There is no limit to the quantity of food supplied to students, who are given the same quality as is supplied to masters, who take their meals in the dining-hall, and who are requested to report to the Principal on all matters concerning the welfare of this department. Although there is no limit to the quantity of food, the strictest economy is exercised, and no waste of any description is noticeable. The laundry work is carried out in a satisfactory manner by the Salvation Army at Taringa.

VISITORS.—There is no doubt as to the interest manifested in the institution by the outside public; this is indicated by the fact that between June, 1901, and June, 1902, 1,563 persons visited the College. It was encouraging to those entrusted with the carrying on of this institution to know that the unanimous feeling was that of the strongest appreciation. This was especially so in the case of practical men, such as the members of the Agricultural Conference, who paid the place a visit on their return from Toowoomba. Reasonable criticism is always invited and appreciated, because I know full well that it is only by such means that progressive work can be carried out on lines that the farmer will appreciate. Unless criticism is offered, there is no chance of giving an explanation of work that may not be clearly understood by some of our visitors.

CORRESPONDENCE.—During the year 1,796 letters were despatched. The total amount of mail matter sent from this office amounted to 2,799 enclosures, many of which covered two or more letters. The greater number of the above letters were in reply to persons requesting information with regard to work carried on here—viz., agriculture, horticulture, dairying, stock feeding and breeding, poultry-raising, pig-breeding, bee-keeping, &c. The work performed and cost of same, together with the various methods of planting and cultivation, are written up each day. A separate account is also kept of the expenditure and earnings of each department, all involving a good deal of book-keeping.

DEBATING CLASS.—During the year the advanced students formed a debating class, which consisted of about twenty members, holding meetings once a week. The subjects for discussion were principally those connected with work done at the College. Such matters were ably dealt with.

The question may be asked—What calling do students follow after graduating at the College? To this, the following is the answer:—During the last four years, 80 students have passed from 1 to 3 years at the College; 73 of these have taken up work in connection with subjects taught here—viz., mixed farming, 40; dairying, 14; horticulture, 5; grazing, 10; agriculture, 2; engineering, 2; 2 have left the State; and 5 are unaccounted for. So far as I can learn, the above are doing creditable work, either on their own land, or managing for their parents. To further encourage ex-students, and to enable us to keep records of their progress and movements, I think it would be a good idea to offer some small prize at the Exhibition of the National Association for the best collection of produce grown or manufactured by students who had attended the College. This would be a new departure, but I think it would work remarkably well.

Students' Life at the College.—During the year there has been no sickness further than ordinary colds and other slight ailments. There are several clubs in existence, such as literary, tennis, football, cricket, &c. As there are several good musicians with us, we are well provided for in this direction.

Religious Matters.—The churches in the neighbouring townships have regular attendants from the College.

A perusal of the foregoing review of the year's operations will, I think, fully justify the statement that the year's work has been most satisfactory, and that the demand for information by people outside the College is rapidly increasing.

In closing this report, I wish to bear testimony to the valuable assistance rendered by the officers in charge of the various works carried on, also to the visiting lecturers, who have materially assisted in the educational part of the indoor work.

JOHN MAHON, Principal.

REPORT OF THE COLONIAL BOTANIST.

In these annual reports only a mere glance can be given of the real work of a botanist, as he is so constantly in request for information regarding plant-life in its multifarious aspects, both by correspondence and verbally. The information given, to be reliable, must be correct, therefore the botanist must possess a fund of knowledge appertaining to plant-life, and must carefully consider the subjects brought before him before giving the information sought. All this, it will be seen, although occupying much time and study, cannot be even vaguely recorded in an annual report. The work, however, I am gratified to know, is acknowledged and appreciated by the people, and it is most encouraging to me to find that a very large number of pastoralists, agriculturists, horticulturists, and others having to do with vegetable products, so constantly apply to me for information, thus practically proving that the people have not lost faith in my knowledge of plants, either as to their classification, cultivation, properties, products, &c. The position of a Government Botanist is not, I fear, understood by some persons, therefore it may not be out of place to point out that his duties are not only confined to supplying information to persons in the particular State by which he is paid, but he is frequently applied to either for specimens or information appertaining to the plant-life of his State or country by botanists and others from all parts of the globe. To comply with such requests I am somewhat hampered by having no regular collector attached to my office.

I have certainly got together a fairly representative herb collection, many of the specimens having been collected during trips taken now and again either by myself or my assistant. For instance, the latter's trip taken last year with Dr. Roth, the Northern Protector of Aboriginals, to the Gulf country, was productive, as I anticipated, of a number of rare and interesting specimens, among which were some new to science. A large portion of the specimens has been received from correspondents who send them for naming, and for information regarding them, and these persons have at all times, at my request, forwarded more of any that I particularly wanted, even, at times, to the extent of the greater part of the species of their neighbourhood or district. By this means I have often received undescribed species and a supply for exchange purposes, enabling me to build up the exotic portion of the herbarium. The want of cabinets, however, for holding these specimens is greatly felt.

There have been but few additions to the botanical library, the purchases having been confined to the usual periodicals. A number of donations from kindred institutions have also been received.

The Museum of Economic Botany, for the want of cases, has not had the additions made to it that I desired. Preparations were made for increasing the carpological and other

collections, but, for the above stated reason, could not be carried out. The carpological collection is a most useful feature in the Museum, and is constantly referred to, especially by students. It is also to be regretted that funds did not allow additions to the wood exhibit to be made. This exhibit is one of great practical value, and should be gradually added to until the whole of the indigenous kinds are exhibited. At present only about half, or a little more than 600, are on view.

In August last, in compliance with a request from the Agent-General, I sent from a private collection of small samples of our indigenous woods, 527 kinds to Mr. Herbert Stone, of Birmingham, England, the well-known authority on woods. These were required for preparing specimens for microscopical examination for a work on the woods of the world which Mr. Stone is preparing. It will be easily understood that such a work will prove of inestimable value to timber merchants the world over, and it was an opportunity of assisting the author, and at the same time benefiting the State, which I thought should not be lost, and I was glad, therefore, to allow the small samples required to be taken from my collection. The only expense incurred by the Department was for cutting, packing, and forwarding to the Agent-General. I am pleased to say that Mr. Stone was highly delighted with the samples, and wrote me word that he had not received such a collection from any other part of the world. So anxious is Mr. Stone that the woods should be correct to systematic name that he refuses all samples unless they have been collected under the direction of a botanist. The European timber merchants have also in many cases had to insist upon the systematic names accompanying samples sent to them from the various colonies, as the vernacular ones cannot be depended upon, the same vernacular often being given to very dissimilar woods. With regard to this matter Mr. Stone writes:—"With reference to the duplication of names (vernacular), some have been employed for so many different kinds that I look upon them as a burden to be borne by the investigator, but of no value in any other respect." With regard to noxious weeds, the drought has had the effect of keeping them in check. Here I may be allowed to say a word or two regarding the prickly pear. This plant has for many years been considered a great nuisance on pasture lands; but, during the present severe drought, stockowners are looking more favourably upon this formidable usurper of the pasture, and are going to some trouble and expense in obtaining the fleshy stems for food for their stock. This is praiseworthy in one point of view, as, by mixing the bruised stems with dry food, the general stock of food may be considerably increased. However, it must be borne in mind that Queensland is one of the best pasture countries in the world, and, although our numerous grasses and fodder-herbs have had a much longer sleep than could have been desired, the rain will come, and then these plants of the former fruitful seasons will reappear. But if through the carting of the prickly pear from place to place its seed be more than usually disseminated, I fear that in years to come the cost of keeping this plant in check will be more than the pastoralist will be able to cope with. The prickly pear is an abundant seed-bearer, and the seeds pass through animals of various kinds uninjured, and I fear that the seeds are destroyed in only a few of the modes adopted in the preparation of the plant for food. Thus attention should, in my opinion, be drawn to the present distribution of seed, and I would most earnestly recommend the very greatest care being taken in using the plant to keep in check, as far as possible, the distribution of seed.

With regard to the suspected poisonous plants, the scarcity of food has caused stock to browse upon plants which they would not have touched in ordinary seasons. Many specimens of this class have been received. Some of these have been of a poisonous character; but of the great number of specimens sent in for identification and report, the really injurious ones have been few.

The blight fungi received for identification have consisted chiefly of well-known species, and I should not have referred to them here had it not been for the destruction which has been caused to the banana crop in the Cairns district by *Glœosporium musarum*, Cke. and M. This species was first observed by me on some bananas offered for sale in Brisbane at the latter end of 1887, and was described by Dr. Cooke and Mr. George Massee from specimens I sent to them at that time. The effect this fungus seemed to have upon the fruit when I first met with it was to cause it to become dry and worthless. Probably the samples I then obtained had been for some days in the shop before I noticed them. Those brought me from Cairns some months ago, instead of being dry, were found to contain a quantity of treacle-like substance in the centre. I was, therefore, in some doubt as to its being identical with the above-mentioned species, but Mr. Massee, to whom I forwarded a sample, sends me word that the two are identical. It is most destructive to the banana crop, and all the diseased fruit should be destroyed, and, as far as possible, not allowed to be shipped from port to port for sale, and so spread the disease.

The publications have been confined to reports, the additions to the Flora having been worked into the publication now being issued, or retained for the addendum of that work, which is now drawing to a close. There has also been published for the Lieutenant-Governor of New Guinea's report a paper on some of the plants collected by His Excellency. This contained descriptions, notes, and plates of several economic plants which would have proved valuable to this State if introduced, and on this account I particularly desired that the papers should be published in the departmental journal. This portion, however, will doubtless be published in journals beyond Queensland, as I have secured a few copies for distribution to persons to whom it may prove of value. The progress made with the work on the "Queensland Flora" has, I am sorry to say, been rather slow. Some idea may be gathered of the arduousness of the work when I state that I and my assistant have freely given up, ever since the work was commenced, twenty hours a week overtime to its preparation at no cost to the State. The late Mr. Chataway had, some time prior to becoming Minister for Agriculture, urged me to prepare as full and complete a work as possible upon the flora of Queensland; and during a conversation after he became Minister he again referred to the subject and asked me to write him a letter stating the number of pages I contemplated it would occupy, and also the length of time the preparation and printing would take. In answer to this, I stated that I considered six parts of 250 pages each would hold the matter, and I hoped that it could be completed in two years. As I had contemplated for years publishing such a work, I, as a matter of course, had a great deal of unclassified manuscript by me, but nothing so arranged that I could speak positively as to the time it would take to complete or the number of pages it would occupy, so my statement as to the size of the work and the time could only be understood as approximate. Now I find the time taken to be three years and the number of pages in each part much more than anticipated, one containing 400 pages and the others all exceeding 300 pages.

During the year my assistant has paid weekly visits to the Agricultural College in connection with the lectures on botany.

F. MANSON BAILEY, Colonial Botanist.

REPORT OF THE ENTOMOLOGIST AND VEGETABLE PATHOLOGIST.

Visitors.—As has been the case in previous years, personal application at the office on the part of the public (the visitors referred to submitting questions pertaining to plant-pathology and agronomic entomology) have been both frequent and concerned with matters of much economic interest.

CORRESPONDENCE AND REPORTS.

Economic Entomology.

In addition to questions raised and dealt with as the outcome of personal application on the part of the public, the following, amongst other subjects, have formed matters for letter and report:—

Apples.—Parlatoria Scale Insect (*Parlatoria proteus*, Curt.), Brisbane; Pale Circular Scale Insect (*Aspidiotus lataniæ*, Sign.), Brisbane; Fruit-fly Maggot (*Tephritis Tryoni*, Frogt.), Brisbane; Pernicious Scale Insect (*Aspidiotus perniciosus*, Comst.), Wellington Point.

Deciduous Fruit Trees.—Plum.—Pernicious Scale Insect (*Aspidiotus perniciosus*, Comst.), Toowoomba; Pernicious Scale Insect, Blackall Range District.

Citraceous Fruit Trees.—Bronze Tree-bug (*Oncoscelis sulciventris*, Stal.), Boonah; Green Tree-bug (*Biprorulus bibax*, Breddin), Indooroopilly; Black Aphis (*Siphonophora* [*citrifolii*]?), Bowen; Fulvous Mussel Scale Insect (*Mytilaspis fulva*, Targ.), Brisbane and Rosewood; Glover's Mussel Scale Insect (*M. Gloveri*, Pack.), Cardwell; White Scale Insect (*Chionaspis citri*, Comst.), Cardwell, Bowen, and Rosewood; Pale Circular Scale Insect (*Aspidiotus lataniæ*, Sign.), Cardwell; Soft Brown Scale Insect (*Lecanium filicum*, Boisd.), Rosewood; Soft Brown Scale Insect (*L. sp.*), Jimbour; Circular Red Scale Insect (*Aspidiotus aurantii*, Mask.), Rosewood, &c.; Bark-eating Beetles, including Green Symphyletes (*Symphyletes nigrovirens*, Don., *Leptops sp.*, *Cryptorhynchus sp.*, and *Orthorrhinus cylindrirostris*, Fabr.), Blackall Ranges; Root-boring Weevil (*Orthorrhinus cylindrirostris*, Fabr.), Brisbane; Leaf-eating Weevil (*Prosayle phytolyma*, Olf.), Mount Cotton; Stem-boring Beetle (? *Uracanthus cryptophagus*, Olf.), Goondiwindi; Fruit-boring

Caterpillar (*Conogethes punctiferalis*, Guen.), Brisbane; Fruit-fly Maggot (*Tephritis Tryoni*, Frogt.), Brisbane, &c.; Spotted Fruit-fly Maggot (*Tephritis psidii*, Frogt.), ? secondary, Brisbane and Nerang; Maori Orange-Mite (*Phytopus oleivorus*), Palmwoods and Burrum River; Scab-producing Mite (*Tenuipalpus sp.*), Bowen, Brisbane, and Maryborough.

MANGO.—Blossom-destroying Beetle (*Monolepta rosea*, Blackb.), Bundaberg and Isis district; Black Soft Scale Insect (*Lecanium nigrum*, Nietner); Soft Scale Insect (*Lecanium scrobiculatum*, Mask.), Cooktown; Pale Circular Scale Insect (*Aspidiotus lataniæ*, Sign.); Purple Circular Scale Insect (*Aspidiotus ficus*, Ashm.), Brisbane White Mango Scale Insect (*Chionaspis dilatata*, Green), Brisbane.

VINE.—Leaf-eating Caterpillar (*Chaerocampa erotus*, Cram.), Yalleroi; Australian Chinch Bug (*Nysius vinitor*, Bergr.), Glass Mountains, on recently set fruit; Pollen-eating Beetle (*Ananca bivittata*, Boisd. [Œdemeridæ]), North Coast Line; Bud-eating Beetle (*Pyropida sp.*), Brisbane; Beetle-borer (*Orthorrhinus cylindrirostris*, Fabr.), Ipswich; White Ants or Termites, Wallumbilla and Texas districts; Fruit-damaging hymenoptera secondary (Honey Bee and *Polistes variabilis*), Brisbane.

PASSION VINE.—Leaf-injuring Mite (*Tenuipalpus sp.*), Rockhampton.

DATE.—Parlatoria Scale Insect (*Parlatoria victrix*), Charleville.

OLIVE.—Dusky Circular Scale Insect (*Aspidiotus Rossi*, Mask.), Landsborough.

PERSIMMON.—Greedy Scale Insect (*Aspidiotus Camelliæ*, Sign.), Sunnybank.

BANANA.—Mealy Bug (*Dactylopius citri*, Risso), Cairns.

COFFEE.—Millipede (Fam. Haplosomide) erroneously regarded as injurious, Daintree River; Scale Insect (*Diaspis biclavis*, Comst.), Cairns.

STRAWBERRY.—Leaf-eating Green Beetle (*Diphucephala sp.*), Landsborough; Red Spider (*Tetranychus sp.*), Palmwoods; Strawberry Aphis, Palmwoods.

POTATO.—Australian Chinch Bug (*Nysius vinitor*, Bergr.), Blackall Ranges; Leaf-eating Ladybird (*Epilachna 28-punctata*, Falr.), Blackall Range and Moorooka; Tuber-mining Caterpillar (*Lita solanella*, Boisd.), Kilcoy and Westbrook; Millipede (*Spirostreptus sp.*), supposed to injure tubers, Landsborough.

TOMATO.—Ribbed Mite (*Phytopus* ———), Brisbane.

SWEET POTATO.—Sweet Potato Weevil (*Cylas formicarius*, Oliv.), Cardwell.

CABBAGE.—Stem-boring Caterpillar (*Hellula undalis*, Falr.), Brisbane and Darling Downs; Cabbage Aphis (*Aphis brassicæ*, Linn.), Toowoomba and Darling Downs.

WHEAT.—False "Wire Worm" (*Antidica pilipes*, Butler, Fam. Œcophoridæ), Darling Downs; Cut-worm (*Agrotis upsilon*, Rutt.), Darling Downs.

MAIZE.—Maize Delphax (*Megalmerus sp.*), Burdekin and Cairns districts; Maize Aphis, Bowen.

COW-PEA.—Aphis (?), Biggenden.

PASTURAGE.—Red Spider (*Tetranychus sp.*), Sandgate.

ORNAMENTAL AND SHADE PLANTS.—1. White Thorn (*Crataegus sp.*)—Pernicious Scale Insect (*Aspidiotus perniciosus*, Comst.), Ballandean. 2. Moreton Bay Chestnut, (*Castaneospermum australe*)—Pale Circular Scale Insect (*Aspidiotus lataniæ*, Sign.) and Mussel Scale I. (*Chionaspis ? nyssæ*, Comst.), Brisbane. 3 Flindersia (*F. pubescens*)—White Mussel Scale I. (*C. ? nyssæ*, Comst.). 4. Eucalyptus, *sp.*—Scale Insect (*Eriococcus coriaceus*, Mask.), Brisbane. 5. Camphor Laurel—Red Scale Insect (*Aspidiotus aurantii*, Mask.), Toowoomba. 6. Cunningham's Fig (*Ficus Cunninghamii*)—Wood-boring Caterpillar (*Aphyoceras lucalis*, Walk. [*Pyralidæ*]), Sandgate. 7. Cupania Anacardioides—Scale Insects (*Chenochiton, sp.*), Townsville. 8. Clerodendron, *sp.*—Olive Soft Scale Insect (*Lecanium oleæ*, Bern.), White Mussel Scale (*Chionaspis ? [albizziae*, Mask.]), and Bird's Dung Scale Insect (*Pulvinaria psidii*, Mask.), Townsville. 10. Camphor (*Camphora officinarum*)—Soft Scale Insect (*Lecanium ? hemispheridum*, Targ. Toz.), Cairns. 11. Bouvardia—Red Spider (*Tetranychus*); Aphis, and Mealy Bug (*Dactylopius citri*, Risso.), Brisbane. 12. Gardenia—Pink Wax Scale Insect (*Ceroplastes rubra*, Mask.), Brisbane.

MISCELLANEOUS PLANTS.—1. Scrub fruit (*Capparis nobilis*)—Spotted Fruit-fly Maggot (*Tephritis psidii*, Frogt.), Grantham. 2. Prickly Pear (*Opuntia*)—Australian Chinch Bug, Bullamon and Mungindi. 3. Chenopodium—A weed-destroyer (*Lixus Mastersi*, Pasc.), Brisbane.

Insects in Arable Land.—Soil-frequenting grub (*Alaus sp.*, Fam. Elateridæ), Cairns; Soil-frequenting grubs (*Harpalus sp.*, Fam. Carabidæ), Mary River: Ground Pearl Insect (*Margarodes sp.*), Bundaberg.

Imported Plants and Injurious Insects.—The Inspectors under "*The Diseases in Plants Act*, 1896," on whom rest the duty of examining plants and fruit on its arrival in the State from outside sources, not being under the direction of this office, it is impracticable to enumerate all the injurious insects of exotic origin that have reached our ports. Those, however, that have come under the notice of the Entomologist, and have formed matters for report, have been as follows:—

Sugar-cane.—1. White Scale Insect (*Chionaspis sacchari*, Zehnt.); Moth Caterpillar-borer, and Mealy Bug (*Dactylopius calceolariæ*?), from Mauritius. 2. Moth Caterpillar-borer, the same. 3. Mealy Bug, the same.

Apples.—1. Oyster Shell Scale Insect (*Aspidiotus ostraeformis*, Curt.), and Pernicious Scale Insect (*Aspidiotus perniciosus*, Comst.), from the United States of America. 2. Pernicious Scale Insect, Mussel Scale Insect (*Mytilaspis pomorum*, Bouché); Codling Moth (*Carpocapsa pomonella*, Linn.); Fruit-fly Maggot (*Tephritis Tryoni*, Frogt.), from New South Wales.

Peaches.—East Indian Fruit-fly Maggot (*Ceratitis capitata*, Wied.), from New South Wales.

Oranges.—Pergande's Parlatoria Scale Insect (*Parlatoria pergandii*, Comst.), and Fulvous Mussel Scale Insect (*Mytilaspis fulva*, Targ. Toz.), from China; Red Scale (*Aspidiotus aurantii*, Mask.), from New South Wales.

Lemons.—Red Scale Insect (*Aspidiotus aurantii*, Musk), Lemon Aspidiotus Scale Insect. (*Aspidiotus Limoni*, Sign.), Fulvous Mussel Scale Insect (*Mytilaspis fulva*, Targ-Taz), Pergandes' Parlatoria Scale Insect (*Parlatoria Pergandii*, Comst.), and Latania Aspidiotus (*Aspidiotus Lataniæ*, Sign.), from Italy (Sicily).

Nutmegs.—Anthribid Weevil (*Araecerus, fasciculatus*, de Geer).

Plants.—*Anonaceæ* from China, a white Chionaspis Scale Insect (*Chionaspis varicosa*, Grn.).

Plum Trees.—Peach Diaspis Scale Insect (*Diaspis amygdali*, Tryon), Japan.

Insectivorous Birds.—The formation of the collection of stuffed specimens of insectivorous birds referred to in the preceding Annual Report has been gradually proceeded with. * * * * * * * * * * * * *

VEGETABLE PATHOLOGY.

The following constitutional derangements or parasitic diseases affecting cultivated plants have formed matters also for investigation and report during the period embraced in this survey:—

Apple.—Bark Canker or "Blotch," Tasmania; Black Spot or Apple Fusicladium, caused by *Fusicladium dendriticum*, on imported fruit.

Plum.—Gumming in fruit, Esk district.

Apricot.—Fruit-Scabbing caused by *Glœosporium sp.*, Darling Downs; Shot-hole Leaf Disease, caused by *Clasterosporium amygdalarium* [*fide* McAlpine], Darling Downs; Fruit Blotching caused by an Exobasidium-like fungus, Darling Downs.

Deciduous Fruit Trees.—Local failure in growth and development, Killarney.

Citraceous Trees.—Scum-like encrustation caused by *Corticeum sp.*, Ormeau, near Brisbane; "False Melanose" due (?) to acarid attack, Maryborough; "Maori Disease" due to Mite (*Phytopus oleivorus*), Maryborough and Blackall Ranges; constitutional disease, Sunnybank; constitutional disease, Charleville; impaired vitality (?) due to drought, Toowoomba.

Mango.—Fruit disease caused by *Glœosporium ? versicolor*, Rockhampton; Leaf Blight caused by *Glœsporium mangiferæ*, Racb., Brisbane.

Coffee.—Bark-canker, a constitutional disease, Daintree River.

Vine.—Fruit Disease caused by *Dematium pullulans*, Loew. (form *Exobasidium*), Nundah and Westbrook; Galls on Wood, Westbrook; Sun Scald, Brisbane and elsewhere; Root Disease, caused by *Heterodera radicola*, Rockhampton; "Black Spot," caused by *Glœosporium ampelophagum*, Sacc., Brisbane.

Strawberries.—Leaf and Fruit Mildew, due to presence of Erysiphaceous fungus [(?) *Sphaerotheca humuli* DC.], Woombye; arrested development of fruit, caused by Red Spider (*Tetranychus sp.*), Palmwoods.

Pineapples.—Constitutional Disease, caused by uncongenial soil condition, Wellington Point.

Rosella (*Hibiscus digitatus*).—Root Disease (?) caused by *Heterodera radicola*, Rockhampton.

Lucerne.—Injuries due to drought conditions, Gatton District.

Wheat.—Failure to set and develop grain (cause—in the absence of sufficient illustrative material—not definitely ascertained), Darling Downs; death of young plants followed by development thereupon of a myxmycete organism, Warwick District.

Potato.—Leaf Disease, probably due to attacks of *Macrosporium Tomato*, Cook, Cairns District; bacterial disease, Blackall Ranges.

Tomato.—Proliferation of floral organs, Morven; Root Disease caused by *Heterodera radicola*, Wellington Point; Leaf Disease, caused by *Septoria lycopersici*, Speg, Brisbane and Wellington Point; Leaf Disease caused by *Phytopus* Mite, Brisbane; Fruit Rot, accompanied by *Fusisporium solani*, Mart., Brisbane.

Cabbage.—Damping Off (*a*), and Leaf Blotch (*b*), caused by *Peronospora parasitica*, de By., Zillmere (*a*), Maryborough (*a*), and Brisbane (*b*).

Prickly Pear.—Apparent Disease involving phyllodia, Mungindi and Bullamon.

Ferns.—Polypodium, Leaf-blotching, a constitutional disease, Brisbane.

Serviceable Diseases.—(*a*) Disease affecting Scale Insects, caused by stage of *Microcera*, of *Sphærostilbe*, Nambour. (*b*) Disease affecting cane-grubs (?), caused by *Cordyceps sp.*, Cairns District.

Note.—The protracted drought that has continued throughout the year has had a directly seriously prejudicial effect upon cultivated plants. At the same time, however, it has limited the attacks of parasitic organisms.

FIELD WORK.

In the North.—At the commencement of 1901-2, I was carrying on investigations in the Northern part of the State, being then in the Lower Burdekin District, (*a*) thence I proceeded to Cairns, (*b*) and to the Mossman, (*c*) and Daintree Rivers, (*d*) returning to Brisbane at the end of August.

(*a*) In the first mentioned district the nature of the so-called "maize blight," that was causing very great loss, was elucidated, and made there the theme of a public lecture, delivered at Ayr, under the auspices of the Lower Burdekin Farmers' Association. Some inquiries were, too, instituted regarding a sugar-cane affection that had been named "Burdekin Rot." Owing, however, to the prevalent dryness, and the consequent non-manifestation of the trouble, this investigation had to be postponed, as had previously happened in the Proserpine Districts.

(*b*) At Cairns the Banana and its diseases first claimed attention, and the following maladies in connection with it formed objects of research:—

(1) A scabby condition of certain faces of the fruitlets, locally known by the Chinese as "colour," and caused by punctures inflicted by a minute thysanopterous insect in feeding.
(2) Root Disease caused by the combined attacks of two nematodes (*Heterodera radicola*) that destroyed the radicles, and a second kind (? *Tylenchus sp.*) that occasioned decay in the primary divisions.
(3) Internal browning and gelatinisation of the fruit, the apparent outcome of root diseases.
(4) Leaf Disease, accompanied by the presence of a specific fungus.

These banana affections had been, and were, the cause of immense and far-reaching loss, and the annihilation of banana growing in some parts of the district.

The Coffee Plantations at Babinda Creek, and at Kuranda and in its vicinity, were also inspected, but the sudden occurrence of a sharp frost in the latter locality, and consequent leaf discolouration in many instances, had the effect of rendering the inquiry impossible of completion, notwithstanding that I was ably assisted by Mr. Howard Newport, whose wide experience and faculties of close observation were freely placed at my disposal.

A week also was devoted to inquiring into matters relating to the Grub Pest of Sugar-cane, as manifested in the Mulgrave and Aloomba districts, but rainy weather and the wide area that had to be overlooked in pursuing the inquiry had the effect of rendering the time available for it far too limited to admit of very material results being

arrived at. However, it was ascertained that in addition to the ordinary Northern cane-beetle grub (*Lepidiota albohirta*) there were at least two other cane-beetle grubs similarly destructive to it, and that one of these, the larva of a brown beetle (*Rhopæa sp.*), appeared to be restricted to particular soils and locations. The fact of these destructive insects being extensively parasitised by a large hymenopterous insect was also discovered, a discovery subsequently announced in a paper communicated to the columns of the *Queensland Agricultural Journal*, entitled "A Parasite of Sugar-cane Beetle Grubs, *Dielis formosus*, Guerin").

Whilst in the Cairns district, the Kamerunga State Nursery was also carefully inspected. The nomenclature of the large collection of varieties of sugar-cane formerly procured in British New Guinea on behalf of the Department by myself was also revised; both there and at Hambledon.

(*c*) In the Mosman River district five days were devoted also to investigations relating to the scarabæid grub-pest of sugar-cane, the identity of the beetles concerned in the depredations experienced, their food plants, and the range of occurrence of their destructive manifestations. The occasion afforded by this visit was also availed of for addressing a meeting of the local farmers' association.

(*d*) In the Daintree River district two days were spent in inspecting the coffee plantations, in company with the Instructor in Coffee Cultivation (who was simultaneously officially visiting the locality), and a preliminary inquiry into matters pertaining to the coffee plants, that had been the occasion of complaint on the part of the growers, entered upon.

This extended Northern expedition resulted in the accumulation of many facts and of much material still to be worked out.

IN THE SOUTH.—(*a*) On returning to Brisbane a short visit was made to the Darling Downs wheat-growing districts, for the purpose of inquiring into the nature and mode of action of an injurious insect affecting wheat that had been spoken of as "wire worm." This was found to be a caterpillar of subterranean habits, the young of a moth named *Antidica pilipes*, Butler, a member of the Œcophoridæ, and not only a new wheat-pest, but the first destructive insect yielded by the family of moths named that has such numerous exponents in Australia.

(*b*) Subsequently, during December, investigations relating to the Scarabæid grub-pest of sugar-cane were prosecuted in the Isis district in continuation of those commenced in a previous year. In connection with these it may be stated that although it was found that five different beetles were concerned, one predominated, an undescribed species of *Rhopæa*, and that this had habits that, insomuch as they were unlike those manifested by the scarabæid beetle, injuriously related to the same plant in the more Northern Districts, were such as to render means for effecting its capture efficacious that were not available to any extent in their case. Owing, however, to the exceptional dry and hot climatic conditions that prevailed at the time of the visit alluded to, and subsequent thereto, almost the entire brood of beetles was destroyed prior to the emergence from the soil. Thus no opportunity occurred for experimentally demonstrating the possibility of capturing these marauders on a large scale in a specially constructed trap-lantern of great powers of illumination as had been projected.

AGRICULTURAL COLLEGE LECTURES.—When not rendered impracticable by field work necessitating absence from the metropolis, two lectures, each of an hour's duration, have been delivered each week to the students at the Queensland Agricultural College. Those addressed have dealt with Systematic Entomology, Economic Entomology, and the Parasitic Diseases of Plants, and have been both well attended and received. Whilst no provision has been made for regular class-instruction in these subjects, these lectures may have served a useful purpose; but formal lectures, especially when unsupplemented by practical work and private study, accomplish at the best but poor results, compared with those attendant on the former method of teaching, in enlightening those who have no previous acquaintance with the province of inquiry to which they relate. At the same time, their preparation and delivery, and the absence from Brisbane and withdrawal from other occupations that these acts have necessitated, have operated to interrupt and suspend important investigations concerned with great public interest. Hence the cry, "What is the Entomologist doing?" may arise. To which this report gives a reply not wholly satisfactory.

"THE DISEASES IN PLANTS ACT, 1896."—The duties of inspector under the Diseases in Plants Act have, with the sanction of the department, been only casually discharged in instances of emergency when none of the permanently employed inspectors have been immediately available for service.

Questions arising in the administration of the Act have, however, from time been referred to me for consideration and report. Moreover, at the instance of individual inspectors, much time has been bestowed on the identification of injurious insects and in the ascertainment of the nature of plant disease. Also, on the action on both of specific disinfection processes.

As a member of the Board of Advice regular attendance, when in Brisbane, has been bestowed on its periodical meetings, and an active part taken in its deliberations and in the formulation of its suggestions.

In the report for 1900-1901 important experiments that had been conducted with reference to the disinfection of fruit by hydrocyanic acid gas were referred to, and the anticipation expressed therein, that there were grounds for concluding that in the near future the findings would find expression in the issue of amended regulations having reference to the fumigation of fruit for export, has been since realised in the issue of regulations of such a nature as is alluded to. And it is gratifying to learn that no complaint has come under notice respecting the condition of fruit that has undergone the fumigation treatment in accordance with their requirements, except in the case of some parcels treated at Maryborough during the early portion of the citrus harvest. And at Brisbane alone no less than 10,479 cases of fruit passed through the Departmental Chambers during the months of May and June alone. This fortunate issue is, however, no doubt principally due, not to a lessening in the amount of re-agents used, but to the prevalent meteorological conditions to which the fruit had been already subject prior to being submitted to treatment: a conclusion borne out by the history of the Maryborough consignments that were reported to have experienced manifest injury. At the same time it bespeaks the care bestowed on the work by Mr. Inspector Liversee, on whom it devolved.

Library.—The additions to the library have been exclusively confined to a few works of periodical issue that have been purchased; and donations received from correspondents of the office, transmitting their gifts from almost all parts of the world. * * * * * * * * * * * * * * *

Collections.—These have been augmented by a few purchases. * * *

Publications.—The following is a list of the publications that have emanated from this office during the year, viz.:—

(1) "Some Obstacles to successful Sugar-cane Cultivation." *Queensland Agricultural Journal*, Vol. IX, pp. 85-89, July, 1901.

(2) "Entomology, Miscellaneous Notes." *Op. cit.* Vol. X., pp. 62-63, January, 1902.

(3) "Vegetable Pathology, Grape Vine Anthracnose (*Sphalacoloma ampelinum*) and Grape Vine Coulure." *Op. cit.* pp. 63, January, 1902.

(4) "A Parasite of Sugar-cane Beetle Grubs" (*Dielis formosus*, Guerin). *Op. cit.*. pp. 130-140, pl. IX. February, 1902.

(5) "Grape Fruit-rots (*a*) Sun-scald and Bees; and, (*b*) Dematium fungus-rot." *Op. cit.* pp. 211-214, pl. XVI. and XVII. March, 1902.

(6) "Maize Blight." *Op. cit.* pp. 334-338. May, 1902.

(7) "Foreign Insectivorous Birds: Importations effected and proposed." (Toowoomba Agricultural Conference). * * * * * *

Note.—The briefness of this enumeration is accounted for by the exactions on my time made by the ordinary duties of office as already set forth.

Acknowledgments.—That this office may have enriched to some slight degree the important sciences to which it ministers, and which direct its activities, may be inferred from the fact that in the most recent Annual Report (*Jahresbericht über die, Neuerungen und Leistungen auf dem Gebiete des Planzenschutzes*) of Dr. Hollrung, of Berlin, on current investigations relating to plant diseases, no less than six distinct references were made to memoirs that have emanated therefrom.

Again, this may also be inferred from the fact that in May, 1902, issue the famous *Zeitschrift fur Pflanzen-Krankheiten*, of Stuttgart, edited by the veteran vegetable-pathologist, Dr. Sorauer, an article of four pages, entitled "Schädigungen der Kulturpflanzen in Queensland," from the pen of Dr. L. Reh, is also devoted exclusively to references to them.

HENRY TRYON,

Entomologist and Vegetable Pathologist.

REPORT OF THE INSTRUCTOR IN FRUIT CULTURE.

Although the year just closed has not been a favourable one for fruitgrowers generally throughout this State, the industry, taken as a whole, has suffered less from the same drought than many other branches of agriculture. The spring of 1901 was a very good one, and there was a promise of a record crop, especially of citrus fruit, but the long-continued drought has destroyed a very large amount of fruit in many districts, only a few favoured places, such as the North Coast Line, producing anything like an average crop. In the Bowen district the question of irrigation for fruit trees has received attention, and a number of windmills, and pumps worked by both steam and horse-power, have been erected between my visits in August, 1901, and June, 1902. The results obtained from which have been highly satisfactory, especially when the irrigation has been systematically and intelligently applied, and combined with thorough cultivation. The drought has taught many growers throughout the State the value of conserving water, and of applying it to their fruit trees during dry spells and thereby saving their crop, and I feel certain from my experience of the Queensland climate, with its recurrent dry spells—especially from July to January—that it will pay all fruitgrowers who have either suitable underground water or the means of conserving surplus surface water, to use or conserve same for use during such dry times, as a single watering at the right time will often mean the saving of a crop of fruit which would otherwise turn out a failure. The orchards of the State are usually very scattered, so that no general schemes of water conservation are possible. In most cases the conservation will have to be undertaken by the individual grower, the quantity conserved depending on individual requirements. Even in ordinary good seasons there is usually a dry spell of longer or shorter duration during the spring months, and a supply of water for irrigation then will be found to be a very valuable asset to all fruitgrowers. If the lessons taught fruitgrowers by the present drought are therefore taken to heart and acted upon, the drought may prove to be a blessing in disguise, and tend to the increased prosperity of the industry in the future.

The deciduous fruit crop of the Darling Downs and Stanthorpe district was a fairly satisfactory one, especially where the trees have been kept free from pests by systematic spraying and the land has been kept well cultivated, thus enabling it to retain moisture for the trees' use. The quality of the fruit produced has been good, prices have been satisfactory, and it has been very free from the ravages of the fruit-fly; so much so that if a determined and systematic attack be made on this insect during the coming season by destroying all infected fruit, especially early in the season, this great pest should receive a serious check and be capable of being kept within bounds.

The pineapple industry has been in a thriving state despite the drought—the quality of the fruit being above average, and the prices better than for some years. A good demand has sprung up for fruit suitable for canning, which has relieved the market, and this branch of the industry is capable of considerable extension, provided that it is worked on the right lines and gets a fair show. Considerable attention has been directed by me to this industry during the past six months, and will continue to be given, as I feel certain that it can be placed on a much better basis than it is at present as the pineapple is one of the few fruits that we can produce to perfection, and of which we have a practical monoply, at any rate as far as Australia is concerned.

During the year there has been a large increase in the number of trees planted both deciduous trees in the Stanthorpe and Downs country, and citrus trees on the coast, and, as far as can be judged at present, there is every appearance of a further heavy planting taking place during the coming spring. A considerable proportion of the planting that has taken place, and that is proposed, consists of varieties of proved merit suitable to the districts in which they have been or are to be planted, so that when they come into bearing their produce will be of the highest value. At the same time, despite all that this department can teach or advise to the contrary, there are still a few foolish persons who will plant varieties of both trees and plants that are quite unsuitable to this soil and climate; but I am glad to say that such are now in a very small minority, the up-to-date fruit growers realising that it does not pay to plant trees that produce inferior fruit or to plant varieties unsuitable to his district.

The question of fighting the various pests attacking fruit and fruit-trees has received considerable attention, and a number of practical demonstrations of both spraying and cyaniding have been given in various parts of the State. These methods of fighting fruit-pests are now coming into general use, several new cyaniding outfits and a number of spray pumps having been started during the year. Growers are realising more and more the necessity of keeping their trees clean if they wish to make fruit growing pay, and this was strongly emphasized at the recent conference at Toowoomba, where there was a unanimous opinion amongst the fruit growers present

that some of the most stringent clauses of the "*Diseases in Plants Act of* 1896" should be put into force, and that the man who was breeding pests to the detriment of his neighbours should be compelled to keep his orchard clean.

During the year a meeting of citrus growers, representing all the Southern part of the State, met at the department's office in Brisbane to discuss the best means of finding satisfactory markets for their fruit, and the result of the meeting was the formation of the Queensland Citrus Growers' Association—the first practical attempt at active co-operation by the fruit growers of this State. This association has been in active operation for some three months, and the results to date are considered satisfactory. The question of the handling, packing, and marketing of our fruit has been gone into fully, and growers are beginning to realise that it pays well to devote extra care and attention to this important subject, as it is no good to produce fruit of superior quality if it is spoilt by careless handling or bad packing.

During the year I have visited many parts of the State, and have delivered lectures and given practical instructions in all branches of fruit culture, including planting, pruning, spraying, cyaniding, handling, packing, &c.; and I am of opinion that this method of practical instruction is both appreciated by the growers, and is tending to the general improvement of the industry—one practical lesson being, in my experience, of more actual value than any amount of theory.

ALBERT H. BENSON, Instructor in Fruit Culture.

REPORT OF THE VITICULTURIST.

My time has been occupied in attending to the vineyards at the State farms, establishing and completing experimental work in the same, the results of which have been and will be published in the *Agricultural Journal*, assisting vignerons at the vintage, selecting soils for vinyards, instructing in pruning and general cultivation, &c. I have contributed articles dealing with Viticulture to the *Journal*, and visited shows to judge wines, grapes, &c.

I have to report upon the work performed on the vineyards at the State farms as follows:—

HERMITAGE VINEYARD.—I have nothing new to report upon this vineyard, which is still suffering from the effects of the frosts and hailstorms experienced in 1899, 1900, 1901. In my opinion, it would be advisable to replant it on another site, as the existing vines are of no practical utility to the district; they were planted too far apart, and the varieties chosen are unadapted to the climate and soil. A few of the vines gave some fine fruit, which was exhibited at the Warwick show, but the bulk of the vines are of inferior winemaking varieties.

WESTBROOK VINEYARD.—This vineyard continues to make satisfactory progress notwithstanding the drought of the past two seasons. There was considerable "coulure" or non-setting of some varieties of grapes, which is attributable to rain and cold winds during the flowering period, and, later on, a persistent drought prevented the berries attaining full size, in some cases causing considerable loss from shrivelling. In spite of these drawbacks, the vineyard gave a fairly good crop, which would have been a heavy one under ordinary circumstances. The greater part of it having been originally planted with wine grapes, the crop of table grapes is at present small. It will, however, shortly be increased by that from the imported vines, which are now coming into bearing. I propose gradually to graft the inferior wine varieties with those of the recently imported whose qualities and disease-resistant powers recommend them as most desirable for propagation and distribution.

Since my last report the first batch of imported vines has been trellised, and promises a crop for the coming season. I hope to report next year in detail upon the quality and value of each variety. The vineyard has been extended three acres during the past year; the varieties planted were the survivors of the second shipment from Europe, including some of the American resistant stocks, together with some table grapes from South Australia, which are not obtainable in Queensland. It is intended to trellis part of the extension this winter, as notwithstanding the continual drought, many of the varieties made a surprising growth the past summer. Experimental work has been carried on during the past year, the results of which have been or will be published in the *Agricultural Journal* if of public interest.

The following is a list of the varieties, wine and table, grown at this vineyard. It should be mentioned that a few are represented by a single vine, sole survivor of

many sent out from Europe. Time will be required to propagate these sufficiently for distribution. There is a large and increasing demand for cuttings of both wine and table grapes from all parts of the State :—

WINE GRAPES—*Red.*—Alicante Bouschet, Aramon, Carbenet, Counoise, Dolcetto, Donzellinho, Durif, Freau, Gamay de Bourgogne, Grand Noir, Grenache, Lenoir, Malbec, Mataro, Merlot, Mondeuse, Mourisco Preto, Muscat Bouschet, Muscat Madeira, Pinot, S. Sauveur, Syrah, Terret, Tinta Amarella, Tinto Cao, Touriga.

White.—Boal, Chardonay, Clairette Blanche, Clairette Rose, Folle Blanche, Gouais, Marsanne, Mauzac, Muscat Lunel, Palomino, Pedro Ximenes, Riesling, Roussanne, Sauvignon Jaune, Sauvignon Vert, Semillon, Sercial, Tokay, Trebbiano, Verdeilho.

TABLE GRAPES—*Red.*—Alicante Blauer Portuguese, Black Hamburg, Black Prince, Black Mammoth, Black St. Peter's, Chasselas Negrepont, Chasselas Violet, Cinsaut, Colorada, Gros Colman, Gros Guillaume, Gros Maroc, Henab Turki, Isabella, Madresfield Court, Mrs. Pince, Muscat Hamburg, Oeillade, Olivette Rose, Pernice, Red Prince, Red Malaga, Royàl Ascot, Schiradzouli, Wortley Hall, Zante.

White.—Admirable de Courtiller, Almeria, Bermestia, Bicane, Centennial, Chasselas d'Ore, Chaouch, Crystal, Dattier de Beyrout, Doradillo, Ferdinand de Lesseps, Mamelon, Madeleine Angevine, Malvasia Bianca, Malvasia Sitzes, Moscatellone, Muscat of Alexandria, Muscat White, Precoce de Malingre, Raisin de Calabre, Raisin de Dame, Rousselet, Santa Paula, Servant, Sultana, Waltham Cross, White Table.

RESISTANT STOCKS—*American.*—Riparia Gloire, Rupestris du Lot, Rupestris Forthworh, Rupestris Martin, Solonis.

Americo-American.—Rip. x Rup. 3309, Rip. x Solonis 1616, Rip. x Rup. 101¹⁴.

Franco-American.—Aramon x Rup. Ganzin No. 1, Mourvedre x Rup. 1202.

Direct Producers.—Bourrisquou x Rup. 3907, Auxerrois x Rup.—Pardes, Chasselas x Rup.

GATTON COLLEGE VINEYARD.—The vineyard planted on the slope near the College building two years ago has made very satisfactory progress so far as growth goes, and as the class of soil in which these vines were planted is abundant in the district it should prove an object lesson to farmers as to its capabilities for fruit-growing. The past summer, like its predecessor, having been practically rainless, the misses replanted in the vines have both years succumbed, and the vineyard is now too far advanced to allow of their being filled up again, consequently some gaps will occur, marring the symmetry of the plantation. Unfortunately, no steps have been taken toward trellising these vines; it is to be feared that some varieties will in consequence prove unproductive as they only bear well on a trellis. The vineyard near the creek suffered considerably from attacks of Anthracnose again this spring. I experimented with various sprays to combat this disease, but with only partial success. I intend to continue this work next spring, as this is the worst disease we have to contend against in Queensland, and a reliable remedy would be of great benefit to our vignerons.

BIGGENDEN VINEYARD.—Notwithstanding the dry season, this little vineyard has made good progress, and produced a first crop of grapes. The quality of the fruit attracted considerable attention, and to judge from the great demand for cuttings sent to the manager from the farmers in the district, the establishment of this vineyard will have the effect of considerably increasing the production of table grapes for which there are good markets at Maryborough, Gympie, and Bundaberg. It has given me considerable satisfaction to see the intelligent interest shown by the farmers and fruit-growers in the various operations connected with the cultivation of the vine, and to know that my endeavours to assist and instruct have been appreciated. I feel sure that grapes will prove a valuable addition to the crops of farmers in this district, provided the correct varieties are planted and a sound cultivation given to the vines. The following is a list of the varieties growing at present in this vineyard; some of them are experimental, and may prove unsuitable to the climate. I hope to report upon them all next year :—

WINE GRAPES.—Aramon, Black Hermitage, Boal, Bourrisquou x Rup., Clairette, Elsinboro, Mataro, Mauzac, Pedro Ximenes, Riesling, and White Hermitage.

TABLE GRAPES.—Alvey, Black Hamburg, Black Prince, Chasselas d'Ore, F. de Lesseps, Goethe, Iona, Madeleine Royal, Miles, Muscat of Alexandria, Muscat Hamburg, Muscat Mrs. Pince, Servant, Teneron, Wantage, and White Morillion.

GINDIE VINEYARD.—I have to repeat the same tale of disaster this year that was told in my last report. The ground that had been cleared and prepared for the vineyard was planted a second time last August with cuttings of Zante currants, Almeria shipping grapes, and several varieties of wine and table grapes. I also planted at the same time the bulk of the young rooted American resistant stock vines transplanted from Dunwich, where they had been in quarantine. A little rain had fallen at Gindie shortly before the vineyard was replanted, and the vines and cuttings made a good start, but from all accounts no rain has fallen from that day to this, with the deplorable result that not only did all the cuttings perish, but also the bulk of the resistant stocks which had been brought from France at great trouble and some expense. I have obtained permission to remove the survivors to the Westbrook vineyard, where I hope to propagate them. It is not my intention to request permission to make any furthur attempts to grow vines at this State farm, as I feel convinced that in this arid zone of country viticulture would be a waste of time and money, and even if partially successful would not be an object lesson to people entirely devoted to pastoral pursuits.

RESISTANT STOCKS.—With a view to being prepared for a possible invasion of the *Phylloxera* pest from the Southern States, a number of resistant stocks were imported from France by this Department, and planted at the Gindie and Westbrook vineyards for the purpose of propagation and distribution should the necessity ever arise. Before any one or more varieties could be recommended as a stock for a given soil it is necessary to prove their adaptability to that soil under the varying conditions of climate and rainfall in Queensland. Although the experience of experts in Europe points out the direction in which our choice should be made, it does not follow that the vines found to be most fitted to a given soil in France would be found to be the most adapted to a similar soil subjected to the extremes of drought and flood in this country. Only after proof has been made over a series of varying seasons can certainty on this essential point be obtained.

The remarkable drought which has afflicted the State for a period of many months has given us the opportunity of testing their resistance on this point on two widely different soils—*i.e.*, the sandy ridges of Gindie and the chocolate soil of basaltic origin at Westbrook. It is an opportunity that may not occur again for years—a possibility that will be viewed with universal equanimity—I think, therefore, it would be useful to record in this report my observations on this important point.

The following table shows the relative resistance of the vines to drought, taking 10 as the equivalent of the most resistant:—

Name of the Vine.	Resistance at Gindie.	Resistance at Westbrook.	Remarks.
Rupestris du Lot	10	1	
,, Martin	8	5	
,, Forthworth	...	3	None planted at Gindie
Riparia Gloire	2	1	
Rip x Rup 101¹⁴	10	8	
Rip x Rup 3309	8	8	
Solonis	...	6	None planted at Gindie
Rip x Solonis 1616	2	2	
Aramon x Rup Ganzin, No. 1	4	9	
Mourvedre x Rup	6	10	

The Gindie soil is a reddish, sandy soil, spare in humus, several feet deep, overlying a gravel of unknown depth, poor in all chemical elements requisite for plant food.

The Westbrook soil is a heavy chocolate to black soil, 12 to 24 inches deep, with a cement-like subsoil of unknown depth, fairly rich in the chemical elements requisite for plant food.

In the first, the Rupestris and its hybrids do best. In the second, the two Franco-Americans do best. In both, the Riparia is an utter failure—always, of course, under drought conditions. We have now to observe their growth under normal conditions and under excess of rainfall in these and other soils.

GENERAL REMARKS.—The continuation of the drought which has inflicted such losses on the pastoralists and agriculturists in the Western districts, has brought more than ever into prominence the fact that around Roma the vine has proved the farmer's friend and support. Had it not been for the occurrence of the two very hot waves last summer, which did considerable damage to the vines, there would have been a fairly

good crop of grapes, and this, notwithstanding four years continuous drought, which has dried up the subsoil to a depth of upwards of 10 feet!

There is no other crop or fruit tree which has given so good a return to the farmers for the last four years as the vine, although the troubles of frost and hot waves have assisted to reduce the yield.

The vine should be far more extensively cultivated than it is around Roma, both for table and wine-making purposes; and, with the experience gained by the drought, it probably will be so. At the same time, farmers hesitate to plant lest, in the future, their wine grapes prove unsaleable; for, they argue, with southern competition in the wine trade and a possible reduction in the Queensland output, grapes would not find a market, or, if so, at non-remunerative prices. This is a mistaken idea I should like to dispel. So far as much of the wine as it is now being made in this State is concerned there will be undoubtedly a reduction in the sale and consequent output, but it is equally true that the consumption of wine in Queensland will greatly increase since, with the entry of southern wines, prices have been lowered and quality raised. Are we to then admit that Queensland's production will decrease because no wine can be made in this State equal in quality to Victorian or South Australian wines? Not so. With a correct procedure in wine preparation, and a proper choice of grapes to make the wine from, as good wine could be made here as in the abovementioned States, and one wine could be made which they cannot produce—namely, sherry. There is an erroneous idea prevalent that claret, chablis, and other wines can be made from any variety of grape, and that if a must, marking only 12 degrees of natural sugar, be made up to 22 degrees or more with cane sugar, it will turn into as good a wine as if it contained 22 degrees naturally. If winemakers insist upon following this procedure, there is small hope of improvement in the quality of their wine. The impulse must, in that case, come from beginners accepting expert advice, or from experienced men who see an opportunity of making wine in this State. The latter, whom in the interests of the grape-grower it is most desirable to attract to Queensland, will not invest capital in the industry unless they are assured that good wine can be made in the country, and that the appropriate varieties of grapes for doing so can be purchased. To prove that wine can be made in Queensland equal in quality to that made in the Southern States, I have advocated the establishment of a State vineyard and cellar, which in a few years would effect its purpose, and could then, if desired, be sold or leased as a going concern, but up to the present this recommendation has not been approved.

With regard to the varieties of grapes that a would-be winemaker could purchase in Queensland, it is a lamentable fact that the most suitable are conspicuous by their absence. Everywhere predominates the Mataro, or Cluster, fit only for coarse ports or to be sparingly blended with the better claret varieties, and the Clairette or Blanquette, which makes but an inferior light white wine. The Carbenet, Malbec, Merlot, or Dolcetto, for light red wines, are not to be obtained, and but a moderate quantity of B. Hermitage. For light white wines there is a little better choice, but some of the finest, such as the Chardonay, are not to be found. For wines of a sherry type not 20 tons of suitable grapes could be bought in the country, and true port varieties are non-existent. Until vignerons take steps to remedy this state of affairs, no experienced man will risk his capital in a cellar and wine-making plant, and the inevitable result will be that Roma vignerons will find increasing difficulty in disposing of the inferior quality of grapes. The remedy is easy. Let them, for the future, plant only the finer varieties, which, if not such heavy bearers, will, with better prices, bring in an equal return; and likewise let them graft gradually their existing inferior varieties with the better kinds—a certain number every season, so as not to be without a crop.

The varieties which it would be advisable to plant are, for light red wines, Carbenet, Malbec, Merlot, Dolcetto, B. Hermitage; and for light white wines, W. Hermitage, Riesling, Chardonay, Mauzac. The above should be planted on the poorer ridges and lower grounds. On the ridges of the best quality of soil, Verdeilho, Sercial, Palomino (called sweet water in Roma), Boal, or W. Portugal; likewise the Grenâche and true port varieties, as these ridges are particularly well adapted for port and sherry types of wine. In dry seasons the density of the must produced on them is too high for light medium wines. The varieties indicated for light red and white wines should also be planted in the Warwick and Toowoomba districts. The above do not comprise all the varieties that could be advantageously planted, but they serve as an indication of what is required by practical winemakers.

The past season has proved an exceptionally bad one to Queensland vignerons. In the spring, coulure or non-setting of a portion of the bunches caused by unfavourable climatic conditions when the vine was in flower. Later on a persistent drought

and a repetition of hot waves from the West caused considerable damage to the crop, especially about Roma, where, in some cases, practically the entire crop of grapes was destroyed.

Generally speaking, the densities of musts were high this season. At Roma I tested a must of the so-called Riesling which was as high as 32 degrees; a B. Hermitage, 28·5 degrees; a Verdeilho, 26 degrees; and Palomino, 24 degrees. 1902 wines should, therefore, turn out of excellent quality, so far as heavy wines are concerned.

In my last report I suggested that an Act similar in character to the Victorian Wine Adulteration Act was required in Queensland to check the sale of fictitious "wine," which is concocted and sold by some unscrupulous people to the harm of the consumer. My suggestion met with opposition from some winemakers on unsubstantial grounds. I would point out to our winemakers that to oppose an Act requiring wine to be made from grape juice is to play into the hands of their unscrupulous competitors to their own damage.

E. H. RAINFORD, Viticulturist.

REPORT OF THE TOBACCO EXPERT.

During the past year a protracted and severe drought has prevailed throughout the tobacco-growing districts of Texas and Inglewood. These are the only districts where tobacco is now grown in this State.

The drought has caused a heavy falling off in the acreage, and also a large decrease in the yield per acre, which is usually a ½-ton. The intended crop was about 1,000 acres, an increase of 25 per cent. over the preceding year, but only one-fourth of the intended area was planted, and about one-fifth of the proposed crop was harvested. The crop of 1900-1 has been sold at an average of about 6d., and the crop of 1901-2 at 8d. to 9d. per lb. at the sheds. Since federation we cannot determine the amount of the home-grown product consumed in this State, as compared to the imported consumed, but have every reason to believe that the locally-grown has continued to increase in popular favour.

Our experience at the Experimental Farm this year, with what is known as Burley tobacco, mentioned in last year's report, has shown that it will not stand the drought and hot winds, as every plant transplanted died; but it is a valuable variety, producing a very valuable tobacco in seasonable years. At the farm, we transplanted about 16 acres, and replanted much of it, but we were only able to keep alive about 7 acres, and that was planted early in the season; and from this we have harvested about 2½ tons of tobacco which, being cut late, has not at this time been fully cured, but bids fair to be a good, serviceable tobacco.

If the coming year is seasonable, there will be a large increased acreage in tobacco, as the demand from the manufacturers of the other States is greatly in excess of what we have, so far, been able to produce, and at highly remunerative prices.

This industry in the State bids fair to become a most important and lucrative one.

R. S. NEVILL, Tobacco Expert.

REPORT OF THE INSTRUCTOR IN COFFEE CULTURE.

The year for coffee has on the whole been satisfactory. The drought has only in one instance had any deleterious effect, and that in Central Queensland and on a young clearing not kept in as good a state of cultivation as might be. The cropping seasons have on the whole been somewhat earlier this year than usual, and the crop itself has been heavy and fairly good.

The drier seasons generally are to the advantage of this staple, and though the bean may, in some instances, be smaller, the quality (*i.e.*, strength, liquor, and aroma, &c.) is improved. The only weak point of the Queensland coffees—and this is only a weak point in comparison with its other high qualities—its "body" or strength of liquor, is showing marked and decided improvement each year. I am of opinion that, as the trees and estates age, this quality in the Queensland coffees will naturally steadily improve, and that it will shortly prove as high in this as it has shown itself to be in every other qualification necessary to ensure its ready appreciation on the

most critical market. The excellent size, colour, shape, aroma, and flavour of the better samples already place it well up in the list of high-grade qualities; its strength compares very favourably also with first-class coffees, and with further improvement, which is taking place, it will have nothing to fear in competition.

For medium grades, of which there is always some produced and in demand, the requirements are somewhat different. Where "body" is not so urgently required to tone up the coarser admixtures or adulterants, size, grading, colour, &c., are looked for, and in this direction there is room for some improvements in the Queensland staple of this class.

Great improvement in the condition of the estates that are being systematically worked is noticeable, especially so in Mackay, Maryborough, Lower Russell, and Daintree River districts, a number of estates in these localities being now in a fair way to do really well.

In very many instances my previous statements with regard to crop-bearing and the reduced amount of field work that becomes necessary (especially weeding) as the age of the plantations increases have been pointedly borne out.

The general curing as well as manufacture of coffee is improving steadily, and the difference between the samples of three seasons ago and those of to-day seem almost incredible even to the growers themselves.

New and cheap machinery manufactured in the country is available for growers, and capable of treating coffee in all its stages, a circumstance that it is trusted will be taken full advantage of; for small, cheap, and yet good machinery of sufficient capacity, for each and almost every separate estate and grower, under circumstances that prohibit co-operation or curing on any central mill system, becomes the only alternative to the production of a poor and badly cured staple.

The only too common ordinary pests and plant diseases of orchard and farm remain still conspicuous by their absence in the coffee estates, but a careful watch is being kept to note, and, if necessary and possible, to nip in the bud anything of this nature that may look as though it might eventually prove troublesome if neglected. For this reason Mr. H. Tryon, the Government Plant Pathologist, was asked to come up, and he toured in the Cairns and Daintree districts in August last.

The season for coffee in the North began, somewhat unfortunately for a few growers, with a frost early in July, 1901. The frost was severe where experienced, and some seven or eight of the smaller, and one of the larger, estates were damaged. The effect of this frost would not have been so great had it not been followed up by an unusually cold wind that kept the trees from naturally thawing till the sunshine fell on them in the morning. This proved somewhat of a disaster, coming as it did, at a time when the growers were just beginning to make headway after two or three years, and in some cases more, of patient waiting, and the discouragement was, by a few, so keenly felt that they decided to abandon their small estates entirely. The crop was fortunately, in most cases, nearly all in, and consequently not much was frost-bitten, and with methods of treating dry cherry at hand, even this small portion of the crop on the trees was not lost. The effect on the trees was to denude them of leaves and woods that would ordinarily be bearing this season and at about the present time. The results may possibly show in the statistical returns for the year.

It was especially noticeable that several estates within the zone of frost that had a favourable aspect and fall-away for the cold air, or were protected from the subsequent winds, quite escaped damage. Though unfortunate and impossible to anticipate as it is, damage by frost is by no means permanent. The trees were not killed out and speedily recovered. Some are already covering as much ground as before, but, of course, the wood is too young and has come too late in the season to bear a crop this year. The frost was not sufficiently severe to affect the ground, and most of the affected areas will eventually really benefit by the enforced rest from crop-bearing, and there is certainly no doubt that the result will be a heavier crop than ever before on most of them, especially those that have been kept clean throughout.

One point especially has been brought prominently forward in the locality thus affected, and this is the advantage of, and consequently the necessity for, new comers paying due attention to the choice of a favourable aspect.

None of the estates below the Range, in the Cairns district, further North or further South, were affected by frost, however, and the season generally has been favourable and the returns fairly good.

In January of this year I visited the Southern States (New South Wales and Victoria) for the purpose of ascertaining how the Queensland product would be likely to fare, what were the requirements of these newly opened up markets, and other points in the interest of the industry in this State. The results of which visit as detailed in my report of March, 1902, may be summed up as follows:—That a large market exists at our doors; that prices can be obtained that allow a handsome margin to the producers; that the industry is capable of extension to nearly twenty times its present extent without exceeding the demand or consumption; that the greater demand is for high-grade coffees; but that good medium qualities are also appreciated, and that the Queensland product can compete favourably with the at present imported coffees.

That attention must be given by the Queensland producers to the curing, grading, and general quality in growing the staple, in order to establish a reputation, was, however, very forcibly shown.

With regard to prices it may be mentioned here also that the large stocks imported prior to the arrangement of the present universal tariff, prevented the immediate benefit therefrom being apparent. These stocks, which it was computed would last about a twelvemonth, will not be exhausted for some months yet, but are already beginning to cause large purchasers to look round for a future source of supply. By the time, therefore, that the crops now coming in are harvested, prices may be expected to rise somewhat, or in other words, the effect of the tariff will be felt to the benefit of growers. Indeed, purchasers or their representatives, have already made their appearance in North Queensland, with the object of ascertaining something of the quantity that may be obtainable in the coming season.

With such prospects as these, and coffee being established on a fairly sound basis from a cultural point of view, it can only be regretted that a larger area is not already under cultivation.

Systematic and methodical work in the field, careful and judicious curing, grading, and cleaning, to suit the requirements of the markets, remain the most important factors in the cultivation of the product. Indeed, while Nature supplies so many advantages and essentials, these become the only factors, and are not difficult of accomplishment to ensure individual success and collectively the establishment or extension of a profitable industry. The application of systematic field and store work to the immediate reduction of cost of production, without detriment to quality, must always be the aim of growers, rather than, as is regrettably too often the case, the agitation for prices to cover the enhanced cost of careless or faulty systems of production—a price that has often to be a fancy one, and considerably above the real value of the article.

Touring has been continued during the past year, and the practical demonstration and local, and therefore directly applicable, information and advice made available, have given in nearly every case beneficial and gratifying results. Sixteen separate tours have been undertaken during the past year, occupying 179 days—an increase on last year. Eighty-six individual growers have been visited, but visits have only been paid to persons or districts that have applied for my services. The districts and places visited include Port Douglas, Kuranda (six times), Myola, Mantaka, Hambledon (twice), Lower Russell (twice), Mackay, Mount Jukes, Hampden, Mirani, Plane Creek, Eimeo, Rockhampton, Yeppoon, Byfield, Tungamull, Maryborough, Pialba, Mount Buderim, Daintree (twice), Atherton (twice).

The places where coffee estates exist, which it was not found possible to visit this year, are Oaklands, Geraldton, Johnstone River, Townsville, Percy Island, Maroochy River, and Bloomfield River.

The work done by correspondence has included a number of reports on various matters affecting coffee cultivation, and on samples of coffee in all stages. The applications for information and advice by letter, as well as applications for visits, have been numerous. The replying to the former has been systematised and made easier, as well as much more satisfactory, by the method of record keeping possible by the use of the printed notebooks obtained last year. The incoming correspondence has increased somewhat this year, and the outgoing slightly decreased. Articles to the *Agricultural Journal*—(1) "Topping and Suckering," No. 10, May, 1902; (2) "Coffee Machinery," June, 1902; (3) "Staking," No. 11; (4) "Cost of Production of Queensland Coffees," December, 1901. It is to be regretted that time did not admit of the writing of more of this series of articles.

HOWARD NEWPORT, Instructor in Coffee Culture.

"*THE SUGAR WORKS GUARANTEE ACTS,* 1893 *TO* 1895."

REPORT BY THE INSPECTOR OF CENTRAL MILLS.

Royal assent to the Amendment Act of 1900 having been withheld, no advances were made to central mill companies during the year under review, the total advances under the Act remaining as before—viz., £498,800 8s. 10d.

No additional temporary advances to the central mills now under Government control were made, the figures standing as previously—viz., Proserpine, £8,500; and Moreton, £5,300.

The season, particularly in the Southern districts, has been most unfavourable, two dry seasons in succession having reduced the cane crop considerably. The Gin Gin Mill in particular had a very trying time; the crop—only amounting to 5,900 tons of cane—was sold to the Bingera Mill, being too small a one to start the mill for.

The following crop return for the past four years will show what a serious falling off there has been at this mill, and the unfortunate position the farmers there now find themselves in:—

	Tons.
1898	40,507
1899	33,293
1900	13,906
1901	5,900

and the season just concluded (1902) saw 2,200 tons of cane pass through the mill, while the outlook for 1903 is very poor indeed.

Generally, the Southern mills have had short crops for the past two seasons, the falling off in comparison with the year 1899 being very noticeable:—

	Tons.
1899	105,773
1900	45,503
1901	60,530

The improvement in the latter year is due to increased areas coming into bearing.

On the other hand, it is gratifying to note the steady improvement at the Northern mills, which is seen from the following:—

	Tons.
1899	156,958
1900	174,371
1901	201,573

The coming season, however, will probably show a considerable decrease in the figures for the Southern mills, while those for the Northern will be about the same as the previous season. Owing to the failure of the rains during the earlier part of the season, the ratoon crop made hardly any growth, and in some instances failed altogether. Excepting at the Johnstone River, where a rather heavy crop was anticipated, the other districts report short crops or crops similar to that of the previous season. The quality of the cane, however, is much above the average, and will result in an increased output of sugar, so compensating in part for the diminished cane supply.

From the statements of expenditure and mill work attached hereto, it will be seen that both in mill work and general expenditure the central mills show evidence of good management and improvement on the previous season's records.

As usual the Isis Central Mill stands out prominently for economical work, and is an easy first in the comparison.

The statement "Northern *versus* Southern Mills" will prove of interest in comparing results for the two great divisions of the State.

The "total cost" of making a ton of sugar varies with the price paid for cane, and it will be seen from this comparative statement that the Northern mills have apparently taken more than the Southern to make a ton of sugar. But as the Northern mills paid on an average 15s. 1¾d., or 4s. 4½d. more than the Southern, the cost per ton of sugar must necessarily be greater. A comparison can only be arrived at by bringing them both on the same plane as far as the cost of cane at the carrier is concerned, when it will be found that the figures would work out—North £7 13s. 4¾d., and South £9 2s. 9¼d. per ton of sugar.

Comparing the cost of a ton of sugar with that of the previous season, it will be seen that the Southern mills have improved to the extent of £1 8s. 1¾d. per ton, while the North has apparently increased the cost by 12s. 8¼d. per ton. This increase is due to the increased cost of cane—viz., 2s. 3d. a ton more being paid this season than the previous one; but for that the figures would work out to an improvement of £1 0s. 3d. per ton over that of the previous season.

There is room for considerable improvement in the methods adopted of supplying the mill with cane. A glance at the "lost time" and its value will show how the irregular supplies of cane to the mill affect the cost of manufacture. This, it will be seen, ranges from 1s. to 5s. per ton of sugar; that is to say, the sugar could have been cheapened to that extent.

The average number of tons of cane taken to make a ton of sugar shows a slight improvement in the North—viz., ·3—and a slight increase in the South, also ·3. This is fairly satisfactory when it is considered that the sucrose content of the cane was generally from ½ per cent. to 1 per cent. less than that of the previous season.

Chemical data are only available from four of the mills, and, as these are not using a uniform system of chemical check, criticism cannot well be carried further. In the case of the four mills, however, it will be seen that mill losses range between 17·95 per cent. and 24·8 per cent. of the total sucrose taken into the mill, which indicates that there is room for improvement in this direction.

Turning to the financial results of the mills, it will be seen that considerable profits have been earned, and that the mills have in most instances been able to meet their obligations to the Treasury.

To the 30th June, 1902, the mills have paid into the Treasury for interest and redemption a sum amounting to £30,834 5s. 9d.; while from the inception of the Act to the same date the payments have amounted to—Interest, £66,055 5s. 6d.; redemption, £23,854 3s. 1d., or a total of £89,909 8s. 7d.

The arrears of interest and redemption stand at £65,481 10s. 2d.

The gross profit earned by the ten mills, it will be seen, amounted to £48,383 15s. 8d., from which £21,591 10s. 3d. is written off for depreciation, leaving a net profit of £26,792 5s. 5d., which is equal to 6·7 per cent. on the capital. This profit has, however, been mostly all absorbed in making further improvements and additions.

The above figures show conclusively that, given fair seasons, our central mills would, without exception, overtake their arrears of interest and redemption, and still pay good prices for cane.

Of the arrears now due, a goodly portion could have been met this season but for the urgent necessity that existed of encouraging the cane-grower, who has had a rough time of it for the past few years.

Figures for the Double Peak Company, which is purely a tramway company, cannot well be included in these statements. The amount advanced to this company remains at £18,200. The arrears of interest being £3,443 3s. 7d., and redemption £1,161 16s. The last season's operations of the company resulted in a loss of £1,673 11s. 6d., including the amount due for interest.

At the two Government controlled mills matters are assuming a more satisfactory position. A slight addition to the Moreton Tramway system and an additional supply of cane trucks for the Proserpine have been provided, which will improve matters at both these mills this season. Cane-planting has been persistently carried on, and it is expected that next season the Proserpine at least will have improved considerably, while for the 1903 season the mill should turn out 4,000 tons of sugar.

"*THE SUGAR WORKS GUARANTEE ACT OF* 1893."

Particulars of Cost of Manufacture at Central Mills, Season 1901.

Particulars.	Marian.	Pleystowe.	Plane Creek.	Proserpine.	Mulgrave.	Mosman.	Gin Gin.	Isis.	Mount Bauple.	Moreton.	Nerang.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Salaries (crushing season only)...	264 10 0	188 15 10	281 18 8	320 4 7	619 18 3	856 11 0	...	311 13 4	161 0 0	200 4 3	85 9 0
Wages	2,742 19 7	1,176 6 0	1,311 3 2	1,301 11 10	4,081 11 7	3,386 18 9	...	1,969 17 4	938 14 6	652 19 4	1,079 13 5
Rations	671 3 9	363 4 11	688 6 10	753 1 4	713 14 8	997 8 9			105 14 0	230 7 4	193 3 0
Firewood	981 0 0	375 14 0	702 3 4	845 0 0	2,233 5 7	1,237 16 0		539 12 8	458 16 9	341 17 0	360 18 8
Mill supplies	567 6 2	368 19 10	463 0 11	353 1 5	690 14 2	453 4 7		354 19 6	284 17 0	127 6 3	366 13 4
Horse feed	73 16 10	12 0 0	20 0 0	16 0 0	115 10 6	61 4 2		58 14 7	18 18 6	27 12 1	...
Total	5,300 16 4	2,485 0 7	3,466 12 11	3,589 19 2	8,454 14 9	6,993 3 3		3,234 17 5	1,968 0 9	1,580 6 3	2,085 17 5
Cane purchased	18,466 9 11	13,941 13 11	17,734 10 0	10,248 4 10	38,840 18 2	46,157 4 8	Mill did not crush this season.	15,869 8 3	6,411 3 5	4,707 0 7	3,448 2 2
Cane haulage, tram and carts ...	375 1 9	811 19 7	1,726 4 5	848 13 4	1,139 14 8	1,848 10 10		2,357 11 7	1,431 12 7	692 17 2	349 8 0
Cane assessment—Sugar Experiment Stations	114 5 9	89 5 4	109 10 1	38 18 11	214 5 9	117 7 7		63 9 10	54 1 8	19 6 6	14 15 3
Total	18,955 17 5	14,842 18 10	19,570 4 6	11,135 17 1	40,194 18 7	48,123 3 1		18,226 19 10	7,896 17 8	5,419 4 3	3,812 5 5
Salaries (off season)	264 10 0	793 1 5	526 4 8	625 8 4	510 0 0	876 18 6	461 14 0	413 0 0	336 10 10	407 8 7	119 15 0
Maintenance, mill machinery ...	No data	No data	568 19 1	616 1 0	1,556 5 2	2,044 19 8	191 2 9	491 7 5	68 9 3	327 0 8	694 4 9
Ditto tramways ...	,,	,,	456 7 1	119 9 11	640 1 7	1,387 19 2	25 18 0	201 1 5	16 15 1	80 10 10	71 17 4
Ditto rolling-stock ...	,,	,,		139 2 11	490 17 9	341 2 3	5 6 1	83 15 8	26 11 10	41 18 1	39 4 1
General expenses	192 3 3	118 4 4	338 18 11	135 9 0	222 14 11	156 11 4	11 12 4	72 3 7	146 4 4	52 3 1	79 4 5
Sugar charges	879 9 2	576 2 0	308 4 3	20 5 6	1,821 4 9	1,250 14 9	...	1,099 9 4	376 11 2	2 3 9	435 1 8
Directors' fees	76 10 0	...	50 0 0	...	300 0 0	60 0 0	...	...	60 0 0	...	...
Auditors' fees	21 0 0	21 0 0	21 0 0	...	16 12 0	20 16 8	10 0 0	21 0 0	12 12 0	...	10 10 0
Office expenses	50 13 5	32 19 1	64 10 6	44 15 5	128 5 6	131 7 11	14 8 11	46 2 7	38 10 11	32 0 4	14 9 7
Insurances	71 11 3	83 12 6	129 2 7	154 18 9	300 4 4	170 17 6	97 8 0	78 11 10	104 19 4	61 6 5	48 18 7
Legal expenses	10 10 0	...	...	14 0 2	19 11 0	61 16 11	0 14 2	...	29 10 0	9 9 0	...
Printing and advertising ...	19 9 2	8 16 0	6 4 4	12 3 6	52 14 8	64 6 0	1 12 3	7 10 3	4 7 3	3 15 0	...
General interest	135 11 10	9 8 2	...	...	906 9 3	653 5 10	...	43 4 3	...	...	20 6 11
Government interest	1,560 0 0	1,418 17 8	2,600 0 0	2,126 4 1	2,442 12 11	3,037 15 1	1,968 14 2	1,315 19 0	1,299 4 3	1,294 0 5	799 19 2
Total	3,281 8 1	3,062 1 2	5,069 11 5	4,007 18 7	9,407 13 10	10,261 11 7	2,788 10 8	3,873 5 4	2,520 6 8	2,311 16 2	2,333 11 6
Grand Total ...	27,538 1 10	20,390 0 7	28,106 8 10	18,733 14 10	58,057 7 2	65,377 17 11	2,788 10 8	25,335 2 7	12,385 5 1	9,311 6 8	8,231 14 4

"*THE SUGAR WORKS GUARANTEE ACT OF* 1893."

PARTICULARS OF COST OF MANUFACTURE AT CENTRAL MILLS, SEASON 1901—*continued.*

Particulars.	Marian.	Pleystowe.	Plane Creek.	Proserpine.	Mulgrave.	Mosman.	Gin Gin.	Isis.	Mount Bauple.	Moreton.	Nerang.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Depreciation written off ...	2,776 10 1	2,027 1 1	3,235 4 11	1,400 0 0	3,193 7 0	2,045 13 0	...	2,993 10 1	1,470 4 1	1,400 0 0	1,050 0 0
Average price paid per ton cane	0 13 5½	0 13 1	0 13 6	0 10 11½	0 15 1¼	0 16 5	Mill did not crush this season.	0 10 4¾	0 9 10¼	0 10 0	0 9 8¾
Ditto cost of haulage ditto	0 0 3¾	0 0 9	0 1 3¾	0 0 10¾	0 0 5¼	0 0 7½		0 1 6½	0 2 2½	0 1 5¾	0 0 11¾
Ditto cost of cane at carrier	0 13 9	0 13 10¼	0 14 10½	0 11 11	0 15 7½	0 17 0¾		0 11 11¼	0 12 1¾	0 11 6	0 10 9
Cost of manufacture per ton sugar 88 n.t.	1 11 8	1 1 9	1 3 6	2 1 10½	1 8 11¾	1 1 6		1 0 2	1 7 9¼	1 17 4¼	3 2 5½
Cost of cane per ton sugar 88 n.t.	5 1 3¾	6 9 10½	6 12 3	6 9 10¾	6 17 8¾	7 8 0		5 13 8	5 11 5½	6 8 1¼	5 14 2
Cost of off season expenses per ton sugar 88 n.t.	0 10 3¼	0 14 0½	0 16 8¾	1 1 11¼	1 3 10¼	1 2 2½		0 15 11¼	0 17 2¾	1 3 9¾	2 5 11
Cost of Government interest per ton sugar 88 n.t.	0 9 3¾	0 12 5	0 17 7½	1 4 6	0 8 4¼	0 9 4		0 8 4	0 18 4	1 10 7	1 3 4¼
Total cost of sugar per ton 88 n.t.	8 4 6	8 18 5½	9 10 6½	10 18 6¾	9 18 11½	10 1 0¾		7 18 0	8 14 9½	11 0 1¾	12 6 6½
Average price realised per ton, including bonus, 88 n.t.	11 0 6¼	11 0 10¾	11 2 10	11 1 10	10 19 2	10 19 9¼		11 8 0¼	10 19 6	11 1 0½	13 7 8
Profit per ton sugar 88 n.t. ...	2 16 0¼	2 2 4¼	1 12 3½	0 2 3¼	1 0 2½	0 18 8½		3 10 0¼	2 4 8½	0 0 10¾	1 1 1½
Loss ditto ditto ...	...	...	...	...	...	...		...	...	...	...
Total profits on season's operation, depreciation not taken off	9,377 7 1	4,847 6 5	4,762 0 5	282 18 5	5,889 17 10	6,083 2 11	...	11,330 2 8	3,166 8 3	59 1 4	707 16 8
Total loss on season's operation, depreciation not taken off	...	...	...	...	...	...	2,788 10 8	...	...	...	...
Total interest paid from inception to 30th June, 1902	10,030 6 7	6,355 0 4	5,896 2 8	...	10,483 9 9	14,144 9 11	6,915 14 10	6,870 18 5	4,169 15 8	350 7 4	839 0 0
Total redemption from inception to 30th June, 1902	2,489 11 4	1,735 12 8	4,150 4 3	...	3,390 12 1	4,232 3 8	...	7,347 15 4	508 3 9	...	...
Arrears of interest to 30th June, 1902	2,000 0 0	4,201 9 2	9,985 5 2	13,521 0 7	...	...	6,469 12 9	...	4,526 15 3	7,191 1 6	5,480 10 4
Arrears of redemption, 30th June, 1902	...	528 14 8	...	3,447 1 10	1 8 4	...	3,191 15 0	...	1,565 4 5	2,097 18 6	1,276 12 8

"*THE SUGAR WORKS GUARANTEE ACT OF* 1893."

Particulars of Mill Work, Season 1901.

Particulars.	Marian.	Pleystowe.	Plane Creek.	Proserpine.	Mulgrave.	Mosman.	Gin Gin.	Isis.	Mt. Bauple.	Moreton.	Nerang.	Totals.
Capacity of mills—tons sugar per annum ...	5,000	6,000	5,000	6,000	5,000	6,000	4,000	4,000	4,000	3,000	2,000	50,000
Commenced crushing	10 July, '01	22 July, '01	10 July, '01	24 July, '01	3 July, '01	2 July, '01	Mill did not crush this season.	30 July, '01	5 Sept., '01	25 July, '01	1 Aug., '01	
Ceased crushing	7 Dec., '01	19 Nov., '01	13 Nov., '01	21 Nov., '01	21 Dec., '01	9 Jan., '02		7 Dec., '01	11 Dec., '01	28 Nov., '01	30 Nov., '01	
Total hours crushing	1,615	938	1,413	982	2,869	3,120		1,998	858	775	678	
Total hours "lost time"	786	47	368	90	141	430		240	68	No data.	122	
Tons cane crushed per hour	16·9	22·8	18·6	19	17·9	18·05		15 2	15·15	12·17	10·45	
Value of "lost time" per ton sugar 88 n.t.	5s.	1s. 0¾d.	4s. 10½d.	3s. 6d.	1s. 4¼d.	2s. 7¼d.		2s. 1¾d.	2s. 0¼d.	...	9s. 6¼d.	
Tons cane crushed	27,415	21,424·55	26,281·3	18,682·3	51,428·55	56,341·55		30,506·2	13,005	9,430·15	7,089	261,603·3
Tons sugar made 88 n.t.	3,348·39	2,285·21	2,950·0	1,714·5	5,836	6,503		3,206·7	1,417·1	846	667·7	28,774·6
Tons cane per ton sugar 88 n t.	8·18	9 37	8·9	10·8	8·81	8 66		9·5	9·17	11·14	10 61	
Tons fuel per ton sugar 88 n.t.	·97	·64	·75	1·5	·79	·62		1·0	1·7	2·02	2·00	
Average cost of firewood per ton in yard ...	6s.	5s. 6d.	5s. 3d.	5s. 6d.	6s.	4s. 7d.		4s. 6d.	4s.	3s. 10d.	4s. 5d.	
Percentage of sugars made, No. 1	81·55	87·86	82·42	79·93	79·04	72·52		96·85	85·42	76·17	65·26	
Ditto ditto No. 2	11·81	·22	17·07	14·77	18·04	23 48		1·47		17·75	16 87	
Ditto ditto X	6·64	11·92	·51	5·30	2·92	4·00		1·68	14·53	6·08	17 87	
Average net titre of sugars, No. 1	96·50	96·12	95·14	95·67	95·36	96·80		94·51	97·54	94·63	98 8	
Ditto ditto No. 2	95·22	89·57	92·22	88·68	91·91	89·48		90·20		79·39	97·9	
Ditto ditto X	83·00	82·34	re-melted	83·80	66·50	79·50		73·29	80·08	68·55	70 0	
Average of all sugars	95·14	95·40	94·64	94·02	92·18	94·25		94·09	95 61	89·75	93·5	
Per cent. cane sugar in juice obtained ...	No data.	15·15	No data.	No data.	14·24	14·93		No data.	No data.	No data.	9·5	
Average quotient		89·45			86 70	84·80					71·4	
Total cane sugar taken into mill		2,678·00			6,619·00	7,313·06					815·29	
Ditto obtained		2,011·00			5,371·00	5,992·10					612 53	
Ditto lost		667·00			1,248·00	1,330·96					202·76	
Total percentage mill losses		17·95			18·83	18·20					24·87	

"*THE SUGAR WORKS GUARANTEE ACT OF* 1893."

Northern *versus* Southern Mills, Comparison of Expenditure and Mill Work—Season, 1901.

Particulars.	Northern.	Southern.	Totals.
Total capacity of mills (tons sugar per annum)	33,000	17,000	50,000
Tons cane crushed	201,573·25	60,030·05	261,603·30
Tons sugar made 88 n.t.	22,637·10	6,137·55	28,774·65
Tons cane per ton sugar 88 n.t.	8·90	9·78	9·09
Tons fuel per ton sugar 88 n.t.	·80	1·4	·92
Average price of fuel per ton	...	...	...
	£ s. d.	£ s. d.	£ s. d.
Total expended on manufacture...	30,290 7 0	8,869 1 10	39,159 8 10
Ditto for cane at carrier	152,822 19 6	35,355 7 2	188,178 6 8
Ditto on off season expenses	21,904 14 11	7,148 12 11	29,053 7 10
Ditto Government interest	13,185 9 9	6,678 17 5	19,864 7 2
Total Expenditure	£218,203 11 2	£58,051 19 4	£276,255 10 6
	£ s. d.	£ s. d.	£ s. d.
Average cost of manufacture per ton sugar 88 n.t.	1 6 9	1 8 10¾	1 7 2¾
Ditto cane at carrier ditto ditto	6 15 0¼	5 15 3½	6 10 9½
Ditto off season expenses ditto ditto	0 19 4¼	* 1 0 7½	0 19 7½
Ditto Government interest ditto ditto	0 11 7¾	* 0 15 4	0 12 5¼
Total cost ditto ditto	9 12 9¼	* 9 2 9¼	9 10 7¾
Average price realised per ton sugar 88 n.t.	11 0 6	11 9 10	11 2 6
Ditto profit made ditto ditto	1 7 8¾	2 7 0¾	1 11 10¼
Ditto loss made ditto ditto	...	...	...
Average net price paid grower per ton cane	0 14 5	0 10 1¾	0 13 5¼
Ditto cost of haulage	0 0 8¾	0 1 7½	0 0 10¼
Ditto total cost of cane at carrier	0 15 1¾	0 11 9¼	0 14 4½
Total profit made on season's operations	31,239 17 10	15,263 8 11	46,503 6 9
Total loss ditto ditto	...	2,788 10 8	2,788 10 8
Interest paid from inception to 30th June, 1902	46,909 9 3	19,145 16 3	66,055 5 6
Redemption ditto ditto	15,998 4 0	7,855 19 1	23,854 3 1
Arrears of interest due to 30th June, 1902	29,707 14 11	23,667 19 10	53,375 14 9
Ditto redemption ditto	3,977 4 10	8,131 10 7	12,108 15 5
Total Government advances received	305,772 1 3	173,980 9 11	479,752 11 2
Average per cent. profit earned on above	† 10·2 %	† 8·7 %	† 9·6 %
Total number of cane-suppliers	406	197	603
Average "cane purchase" distributed per grower	£358 2s.	£154 10s.	£291 11s. 8d.

* Not including Gin Gin Mill expenditure. † Not allowing for depreciation.

Return of Redemption and Interest Paid, and Redemption and Interest Due, by Sugar Mill Companies under "The Sugar Works Guarantee Acts, 1893 to 1895," as at 30th June, 1902.

Name of Company.	Amount Advanced.	Interest paid during 1901-1902.		Total Redemption Paid.	Arrears of Interest Due and Unpaid to 30th June, 1902.	Redemption Due to 30th June, 1902.	Total Amount Interest and Redemption Due to 30th June, 1902.	Remarks.
		Amount.	Date to which Paid.					
	£ s. d.	£ s. d.		£ s. d.	£ s. d.	£ s. d.	£ s. d.	
Double Peak	18,200 0 0	Nil	31 Dec., 1896 ...	Nil	3,443 3 7	1,161 16 0	4,604 19 7	
Gin Gin	50,000 0 0	Nil	30 June, 1899	Nil	6,469 12 9	3,191 15 0	9,661 7 9	
Temporary Advance...	2,000 0 0	Nil						
Isis	38,636 0 0	a 1,963 9 4	30 June, 1902	a 7,347 15 4	Nil	Nil	Nil	a Includes £647 10s. 1d. Interest and £543 16s. 7d. Redemption paid since 30th June, 1902.
Johnstone	847 17 8	...	...	...	...	...	...	Matter in abeyance.
Marian	39,000 0 0	b 2,639 18 5	On Account to 30 June, 1902	b 2,489 11 4	2,000 0 0	Nil	2,000 0 0	b Includes £2,639 18s. 5d. Interest and £1,879 7s. 7d. Redemption paid since 30th June, 1902.
Moreton	32,864 15 0	Nil	On Account to 30 June, 1897	Nil	7,191 1 6	2,097 18 6	9,289 0 0	
Temporary Advance...	5,300 0 0	Nil	Nil					
Mossman	66,300 0 0	2,569 0 2	30 June, 1902 ..	4,232 5 6	Nil	Nil	Nil	
Mount Bauple	32,480 16 1	c 640 14 9	On Account to 31 Dec., 1900	c 503 3 9	4,526 15 3	1,565 4 5	6,091 19 8	c Includes £640 14s. 9d. Interest and £503 3s. 9d. Redemption paid since 30th June, 1902.
Mulgrave	46,000 0 0	1,782 8 6	To 30 June, 1902	2,934 19 10	Nil	1 8 4	1 8 4	
Nerang	19,998 18 10	Nil	On Account to 31 Dec., 1896	Nil	5,480 10 4	1,276 2 8	6,756 13 0	
Plane Creek	65,000 0 0	d 3,535 12 5	On Account to 30 June, 1902	d 4,149 5 6	9,985 5 2	Nil	9,985 5 2	d Includes £1,552 12s. Interest and £2,115 6s. 4d. Redemption paid since 30th June, 1902.
Pleystowe	35,472 1 3	1,374 9 8	On Account to 30 June, 1901	1,735 12 8	4,201 9 2	528 14 8	4,730 3 10	
Proserpine	54,000 0 0	Nil	None paid	Nil	13,521 0 7	3,447 1 10	16,968 2 5	
Temporary Advance...	8,500 0 0							
	*£514,600 8 10	£14,505 13 3	...	£23,397 13 11	56,818 18 4	13,270 1 5	70,088 19 9	

* Under "*The Sugar Works Guarantee Acts, 1893 to 1895*"	£498,800 8 10
Temporary Advances to Mills under Government control	13,800 0 0
Temporary Advances to Gin Gin Mill ...	2,000 0 0
	£514,600 8 10

Interest paid prior to 1901-1902	£52,952 18 5
Interest paid during 1901-1902 (including £5,480 15s. 6d., paid since 30th June, 1902)	14,505 13 3
Total	£67,458 11 8

Redemption paid prior to 1901-1902 ...	£11,459 10 9
Redemption paid during 1901-1902 (including £5,046 14s. 3d., paid since 1st July, 1902)	11,938 3 2
	£23,397 13 11

When "*The Sugar Works Guarantee Act Amendment Act of* 1900" was passed the above Loans were Consolidated, and Redemption, under the provisions of this Act, was charged the Mills as from 30th June, 1900, arrears of Interest only being brought forward. The total amount of Redemption Due and Unpaid to the 30th June, 1902, is £13,270 1s. 5d., as above.

REPORT OF THE DIRECTOR, BOTANIC GARDENS AND GOVERNMENT DOMAIN.

The Botanic Gardens and Government Domain, under my management, have been maintained during the past year as well as the reduced vote and the protracted drought would admit.

The vote has been gradually reduced during the past few years, until last year it stood at £350 less than the average for the preceding twenty-one years; and I have now received instructions that it is to be still further reduced by about one-fifth as a part of the general scheme of retrenchment. It is, perhaps, superfluous to add that I am straining every nerve to preserve the Gardens as far as possible under the depressing conditions until the return of better times. A glance at the Estimates for the past few years will show that I am now charged with the duties and responsibilities formerly engaging the attention of four officers; and I feel that this will be regarded as a fairly reasonable contribution to the general measure of retrenchment sought to be effected.

It is difficult to write calmly about the want of a water supply after viewing from day to day the havoc wrought by the absence of that abundant supply which the trees and shrubs enjoyed until within the last few years, and which alone made their growth here possible. For many years the Gardens had a very fair supply of water. The Works Department paid the Board of Waterworks £100 per annum for all the water used. A few years ago, however, the Board, being of the opinion that a larger sum should be paid for the water which was being used to enhance the beauty and value of the People's National Gardens, decreed that in future the water should be measured through meters, and paid for at the rate of 1s. for every 1,000 gallons. This limited the consumption to 2,000,000 gallons yearly. This may sound large to persons not accustomed to deal with water supply matters. It really means 2 inches of water spread over the Gardens, or about one day's steady rain. A pond 77 yards square and 1 yard deep holds 1,000,000 gallons approximately. A better idea may perhaps be formed by remembering that 100,000 gallons will cover an acre 4½ inches deep. The Botanic Gardens at Adelaide use every year 40,000,000 gallons for an area similar to that with which we have to deal, and this in a normal year, when no drought has to be fought. Imagine then what chance one has in a drought like this, with 2,000,000 gallons. But last year, in the face of the greatest drought on record, this was reduced by 25 per cent., or to 1,500,000 gallons, for at the commencement of this year the Works Department declined to pay for any more water for the Gardens, as it was not required for public buildings, and the already reduced vote of the Gardens had to stand the cost. It is very hard to see the plants perishing, the ponds empty, the waterfowl dying, and a general state of desolation prevailing, and at the same time to see the water, which would save so much, being used to water the streets and to flush the sewers, a duty which, one would imagine, might just as well be performed by salt water from the adjacent river. In my anxiety I waited informally upon the Board of Waterworks and asked for at least a reduction in the price in order to enable me to distribute a little more water amongst the starving plants, but to my infinite regret, learnt that the Board could not afford it. It will be seen that I have done all in my power to prevent the damage which has already accrued, and to avert the preventable calamity which threatens the Gardens through the want of a tolerable water supply. I ask that a free water supply be granted to the Gardens as formerly, in the interests of one-fourth of the inhabitants of Queensland who live within a few miles of them, and of the Gardens as a national institution. During a recent water scare in Sydney, the Government and people of New South Wales insisted that whatever private gardens went short, or whatever economies were enforced, the supply of water to the National Botanic Gardens in Sydney should not be reduced below a safe limit. The lily ponds and lagoons, which contained fine collections of aquatic plants are completely dried up for the first time in forty years, and could not have been replenished, except at a cost which was utterly prohibitive, considering the circumstances referred to above. To have kept water in them would have necessitated the payment to the Board of Waterworks of the entire vote.

A change has taken place in the management of the refreshment kiosk during the past year. This institution was established in 1891 for the purpose of providing light refreshments for visitors, and a ground rent of £25 per annum was charged for the privilege of selling such refreshments. The lessee gradually extended his business to include luncheons and the like, and largely extended his premises, and the area of the land occupied by him. No objection was made to these extensions, and his rent remained the same. When, however, he had enjoyed this monopoly for eleven years, and the pressure of circumstances necessitated the dismissal of several of the Gardens' staff, it was felt to be only right that a fair rent should be obtained

for the concession. The right was accordingly submitted to public tender, and the sum of £400 per annum was offered and accepted, no offer being made by the out-going lessee. As the site of the old kiosk is included in a dredging scheme contemplated by the Government, advantage was taken of the change to transfer the site of the new building to a more central and accessible position.

The cages in which the small animals, natives of the State, have been kept have been in constant use for about forty years, and have been for some time a serious menace to the public health. I have had new cages made with the ordinary labour, and the old cages cleared away. The new ones are in an airy position, well ventilated and more healthy and suitable in every way. The two Japanese bears, presented to the gardens by Mr. Justice Chubb, have thriven in their new quarters in a remarkable way, and have been a source of great interest to visitors, especially to the young. At the same time the increasing number of birds and animals has proved a greater tax upon our slender resources in the matter of food and attendance than would be readily imagined.

The necessity for cheap and permanent labels being attached to the trees and plants here is obvious, and has only been met within recent years to any considerable extent. I have invented a plain and practically imperishable label, together with a simple device for stamping it, and during the past year about 1,000 trees and shrubs have been permanently and plainly labelled with their scientific and common names, natural orders, and native countries. A list of these lies before me, but in the present state of the public finances, I do not ask that it be published; indeed, I have but little faith in the "educational value" of lists of Latin names and technical terms. I have had some experience, but have never known anyone to be "educated" by them, although I have known many to be discouraged.

I have laid before the Minister for Public Instruction, through your Department, a scheme for the encouragement of Nature Knowledge Study in the State schools, a subject in which, as you know, I have had much experience, and which my horticultural classes in the Gardens served to introduce into the Queensland schools. I wished to inexpensively organise such study. The matter met with much sympathy from both Departments, but it seems to be felt that this is hardly an opportune time for new departures; at least, the subject seems to be at rest for the present.

Since my scheme was laid before you, Victoria, upon the advice of the new Director of Public Instruction, has adopted the system, and anyone who has watched the remarkable progress of this phase of industrial education in other lands during the past few years cannot doubt that in the race for agricultural and commercial supremacy between Victoria and, say, Queensland, the former State will find this natural and inexpensive system of industrial education an immense help.

A constant correspondence has been maintained with kindred establishments, and large numbers of seeds introduced, raised and prepared for distribution. A copy of my Seed Register might prove interesting to a few persons engaged in similar pursuits, but I see no justification for swelling this report by its inclusion here.

I should like to be permitted to mention the deep interest which is taken by His Excellency the Governor and Lady Chermside in the Gardens, and in horticulture generally. His Excellency takes an especial interest in forestry, in which, as an extensive planter and wide traveller, he has had a large experience, and I have been much encouraged by the interest he has shown in my work.

PHILIP MAC MAHON, Director.

REPORT OF THE MANAGER OF THE STATE NURSERY, KAMERUNGA.

Owing to the distance from Brisbane, and the comparatively early date at which the report has to be written to arrive at the head office in good time, this season's report virtually only covers eleven months' work—*i.e.*, from 1st July, 1901, to 31st May, 1902.

The weather during the past year has been unseasonable. The drought has not, however, affected the immediate locality severely, nor have plants suffered, or has work been hindered to any extent. The rainfall for 11 months totalled 48·772, which is but little over half last season's fall. Some rain, however, fell every month. Of the total nearly 25 inches fell in February and March, the average being roughly 2½ inches for each of the other months. No very cold weather has been experienced at the Nursery during the year, the lowest record being 39 Fahr., on the 30th of

July, 1901. Frosts were, however, experienced in the district in many places, and some damage was done to tropical plants during that month.

The trouble mentioned in last report with regard to the overcrowding of trees that have been planted too closely is still experienced, and some discriminate thinning out has been necessary in consequence. The general growth of the trees and shrubs has been good, and the condition of the Nursery better than it has ever been. The field work has been heavy, and several works, in the way of repairs to the permanent improvements that were necessary, have been carried out by local labour.

Applications received for plants and seed, &c., have been numerous, and consignments sent to all parts of the State, Fiji, Samoa, New Guinea, Ceylon, and the Southern States.

The following shows the totals distributed in this manner:—

Seed.—5 cwt. 0 qr. 11 lb. 6½ oz.

Plants.—2,363.

Cuttings.—1,192.

Rhizomes.—1 cwt. 10 lb.

Bulbs and suckers.—266.

Cane (plants only).—1 ton 4 cwt. 2 qr. 23 lb.

Grass roots (mainly *Paspalum dilatatum*).—5,480.

Various.—Fruit, several cases; ferns, 1 crate; divi divi pods, 1 bag (80 lb.); green tea leaves, 2 lb.

Besides these consignments, a good stock of seed is on hand for later distribution. The correspondence has again been a heavy item, and the number of distributions and items of disbursements, postages, &c., having to be given in detail each month, have necessitated lengthy and somewhat voluminous monthly returns and accounts. The incoming letters (for the eleven months amounted to 540, and the outgoing to 680. The items of distributions requiring entry and re-entry numbered well over 1,600, or an average of nearly 150 a month.

The fields of the original Nursery, nine in number, and the new field opened last year are utilised as follows:—

Field 1, *Sec. I.*—Citrus fruit trees, palms, Ceara and Assam rubber trees, tea, cocoa, coffee, and kola-nut trees, and other varieties of economic trees and plants. This field is one of the best in the Nursery, but may now be said to be completed in so far that, being temporarily planted up with trees, no land is available for further cultivation; experiments on such areas being almost entirely confined to tapping, or crop gathering and treatment.

Field 1A (a small corner piece).—Contains Manila hemp and eight other varieties of the Musa family.

Field 2, *Sec. I.*—On which the cottage and office buildings stand, is also permanently planted up with various fruit and other trees and plants, among them the tamarind, Fijian almond, cassava, cotton, castor oil, &c.

Field 2A is divided up into nursery beds for fruit, shade and timber trees, fibres, and other seedlings.

Field 3, *Sec. I.*—On which the germinating-house and meteorological instruments stand, is occupied by mangoes, varieties of custard apples, fibres, and citrus trees, Queensland arrowroot, granadillas, and chokos—the latter on frames.

A portion of this block is also under grass in stools, mostly *Paspalum dilatatum*. Only a small portion is ordinarily utilised for constant work, and is then occupied with such temporary plants as tobacco, herbs, certain vegetables, beans, &c.

Field 1, *Sec. II.*—In this field a new footpath 4 feet wide has been put in, cutting off the portion shaded by the large trees in the main avenue, and therefore useless for field experiments. The area thus cut off is being tried under *Paspalum platicula* and other grasses. Either side of the footpath has been planted with varieties of palms. The rest of this field, which was under green manure last season, has been occupied with the new American varieties of maize, sorghum, millets, &c. There are also vi-apple and breadfruit-trees permanently planted on the borders.

Field 2, *Sec. II.*—Of this field, on which the stables and bushhouses stand, about one-half is permanently planted up with Para and Central American rubber-trees and eight varieties of breadfruit from Samoa. The temporary cultivation consists of varieties of sweet potatoes, Bermuda arrowroot, and cow-peas. Planted along the borders are divi divi-trees and bastard sago palms.

Field 3, *Sec. II.* is the poorest and most stony field in the Nursery, and is again this year under beans and cow-peas.

Field 1, *Sec. III.* is entirely under Ceara rubber. On the borders, permanently planted out, are mango-trees, cocoanut, and West African oil palms, and a few others.

Field 2, *Sec. III.*—About one-half of this field is also permanently occupied with the new African rubber-trees, but as these are as yet young, and are planted 20 feet apart, varieties of papaws have been planted in the rows, and beans and cow-peas between them. The temporary cultivation consists of New Guinea palms and turmeric, a further portion being now under the plough. The borders are planted with mango-trees, sour sop, areca palms, &c.

Field 3, *Sec. III.* is under Ceara rubber, grasses, canes, and pineapples.

The new clearing opened last year contains young cocoa-trees, vanilla, *Piper Nigrum, P. Methysticum, Monstera deliciosa*, and some *Castilloa elastica* trees; and, under temporary cultivation, some tobacco, pumpkins, rice, ginger, &c.

The following is a general report upon the main branches of economic plant life that are being cultivated, propagated, acclimatised, or experimented with on the nursery:—

Sugar-Canes.—During September, in accordance with, and in completion of, standing instructions, as complete a list as possible of specimen plants of each of the varieties in the collection of canes at the nursery was sent to some fifteen sugar plantations. The canes were well grown and in good order, were carefully examined for disease, waxed at the ends and specially packed. The collection consisted mainly of the valuable New Guinea canes. Subsequently, in accordance with instructions, no further attention is being given to them, and no distributions made. A few canes raised from seed last year are still in existence, but are not being cultivated.

Citrus Trees.—The special attention given to these trees in spraying, and careful collecting of fly-affected fruit, has shown satisfactory results this year, for although the nursery is surrounded by scrub containing many wild fruits, badly infested for the greater part of the whole year, a very fair crop has been obtained, and loss from fruit fly less than has been known for years. Flying foxes have also not been so troublesome. The Washington Navel trees have not only given a fair crop, but the fruit has proved a very fine orange, large, thin-skinned, practically seedless, and very sweet. Plants are obtained by the Indian method of branch rooting, and limited quantities are available. An apparent hybridisation has been noticeable from this seedless variety—several specimens of Mozambique and Mandarin oranges betraying the navel as well as the general characteristics of the Washington Navel Orange.

A large number of scions, grafts, and seedlings of all varieties of citrus trees have been distributed.

Bananas.—Very little has been done beyond preserving the better varieties of these. A number have been distributed to applicants, and a small collection was despatched to Ceylon.

Cocoa (*Theobroma cacao*).—A number of seedlings were raised from the seed of parent plants in the nursery. The cocoa trees, however, do not thrive. Three large trees have died out during the year, two from grubs or borers in the roots, and one apparently from a species of dry rot in the root. Some trouble has been experienced also in the new clearing with the young cocoa plants, many of these dying and having to be replanted from the same cause. Those now growing, however, give good promise. A few plants in pots are still available, but they would seem to be delicate and to require special and constant attention in the field.

Mangosteen (*Garcinia mangostana*).—The two trees transplanted last year have died out. One now growing in the nursery would also seem to be dying. The dry season and lack of atmospheric moisture this year have been against such trees as these, that naturally thrive under the more especially humid conditions of a tropical climate.

Palms.—The list has again been considerably added to, and a large number of plants distributed. A number are in bearing, and it is anticipated that several other varieties will bear during the coming season.

Breadfruit and Jackfruit.—Both of these have been bearing well this season. The former, especially, which have now regained all they lost in the slight frosts of 1899. The new varieties obtained from Samoa are doing well, and constitute a valuable collection.

Spices.—The department is to be congratulated upon obtaining seed of nutmegs and cloves. These have been carefully set, and it is to be hoped will germinate well; but this is unfortunately by no means a foregone conclusion; some of the cloves had already put out rootlets in the charcoal packing when received. The success of these

is regrettably doubtful, as the vitality of either is known to be short. Cinnamon and allspice plants have been germinated, and are available. Black pepper and the two plants of cardamom are doing well, but are not yet in bearing. The vanilla plants obtained from Fiji are doing particularly well, but have not yet blossomed.

The algaroba or mesquit bean has borne a good crop, but the kola trees, though showing a few blossoms, failed to set any nuts. The candle tree blossomed, and loquats bore for the first time this season; whilst the *Monstera deliciosa*, which bore no crop last year, is carrying several of its curious fruit again.

All the varieties of fibres are doing well except ramie, which, it not being possible to obtain sufficiently moist conditions for on the nursery, remains somewhat stunted. Plants of all varieties are available. Pines have done well, and so far remained very free from disease. All varieties of tobacco have done especially well, and a good stock of seed was obtained and sent to the tobacco expert. Plants of tea have been raised, and are available. Cassava, yams, arrowroot, and ginger, and all root crops have done well this year. Cotton of two varieties, Sea Island and Egyptian Upland, thrive, and plants in their second year are bearing heavily. Mature and good seed of both varieties is available in limited quantity. The vi apples bore heavily again, and granadillas and the new choko vegetables have carried crops above the average.

Paspalum dilatatum and other grasses have been in great demand. A small charge has been made for the former, but the stock in hand proved insufficient to supply all applicants, and some applications are being held over until the end of the year, when a quantity will be again available for distribution.

INDIGENOUS TIMBER TREES.—Seed of several of these has been received from the Conservator of Forests. The seed has been carefully set in germinating beds, and will subsequently be put out into nursery beds, and plants be available in quantity later on for re-afforestation or any other purpose by the Forest Department.

RUBBERS.—*Manihot glaziovii* (Ceara) has done well. This season experiments are being conducted in tapping them by several methods. The trees sufficiently large to tap are still very few in number. Seed in quantity is available. *Hevea Braziliensis* (Para) is the best variety of rubber. The trees put out in the field some three years ago are growing rapidly, and under cultivation seem to have done better than they do in their indigenous or natural state, as shown by existing records. They are, however, still somewhat slender, and are not old or large enough to tap. Central American rubber (*Castiloa elastica*): These trees proved to be much quicker growing out in the field than in the nursery beds, and are now doing well and showing remarkable growth. This is one of the quickest of the rubbers to come into bearing, but the trees are still too young to experiment with. An effort is, however, being made to raise plants from small slips of both of the two latter varieties. *Ficus elastica* (Assam rubber): The three large trees in the nursery have grown well, and although not yet within many years of the age at which rubber is usually extracted from these trees under ordinary conditions, they have been experimentally tapped during the year with exceedingly satisfactory results. Further experiments are being conducted while this report is being written. The rubber produced would, so far, seem to be a better quality than is generally obtained from the *Ficus elastica*. Cuttings are readily propagated and are available in quantity at all times. West African rubber (*Tabernaemontana crassa?*): Most of these trees have come into bearing this year, and experiments in tapping have been conducted. So far the product seems to be more waxy than elastic. A few plants were raised from the seed of three fruits obtained last year. This tree seems to have readily adapted itself to the climate and soil of the State, and promises to be a valuable one, as well as one of the quickest in bearing of rubber-producing plants.

It is proposed, as the experiments in tapping now being conducted are completed, to deal with each variety of rubber in detail in the *Agricultural Journal*.

MAIZE.—The red Jamaica maize supplied by Mr. Pink has done well, but owing to drought only sufficient seed was obtained to replant. Of the American maize, the five varieties—Golden Beauty, Leaming's, Legal Tender, Piasa Queen, and Riley's Favourite—were sown on the 6th January, but owing to unexpectedly dry weather, and later on to a small plague of caterpillars, did not do well. Under the circumstances, therefore, it is impossible to judge of them. The seed obtained was resown on the 27th of May, and, the weather being more favourable, they are so far doing very well.

SORGHUMS.—Of the four varieties of American sorghum—Coleman's, Folger's Early, Early Orange, and Collier's—the first planting out on the same date as the maize, was not an unqualified success for the same reasons, but was by no means a

failure. Folger's Early proved to be the best, being taller and having the larger head and heavier grain. Coleman's proved very irregular, varying from amber to black in colour and being equally as variable in length of stalk, leaf, and size of head. The American Early Orange Sorghum would seem to be quite different to the sorghum of that name already under cultivation here. This and the Collier Sorghum proved but indifferent varieties, and none of these new sorghums equalled in any point the Giant Honduras, which seems to improve with every generation. Next to this the Planter's Friend has proved excellent, and two varieties of *Saccharatum* come next again in order of utility.

It is possible that these new American sorghums may improve as they become acclimatised, and on a second planting on 20th March, these imported varieties are already doing better.

MILLETS.—The four varieties of millet—*Panicum millaceum, Pennisetum spicatum, Setaria italica, and S. germanica*—were, unfortunately, all found to have lost their vitality. The seed was sown in the open on three separate occasions without result, and unsuccessful efforts were made to germinate the last few ounces under glass in the germinating house.

COWPEAS AND BEANS.—No new varieties of cowpeas have been obtained, and some of the least useful have been allowed to go out of cultivation. White's perennial still proves the most useful in every way under the conditions obtaining here, and the Speckled Cowpea is the next. All the beans have done well. As a nitrogenous green manure the Florida Velvet and Green Mauritius still hold first place. Experiments are being conducted with the Pigeon-pea (*Cajanus indica*) as a green manure, this growing readily and having the advantage over the matted growths of the beans of very much easier manipulation in the subsequent ploughing in. No comparative value can yet be ascertained, however.

RICE.—The supply of seed from Japan proved as great a disappointment as the millets. The seed was distributed in the district, and only one or two heads altogether were known to have been obtained. That sown in the open at the Nursery proved a failure likewise, and a few seeds germinated in water under glass gave no seed.

The following were obtained during the year, some of which were not previously in stock:—*Aegele marmelos* (bael fruit), *Quercus suber* (cork oak), *Grevillia robusta* (silver oak), Palms (about forty-five varieties), white Madagascar bean, *Eucalyptus calophylla; E. ficifolia, Myristica fragrans* (nutmeg), *Eugenia caryophyllata* (clove) *Araucaria Bidwillii* (bunya bunya), *Solanum betacea* (tree tomato), *Dactylis glomerata* (Cocksfoot grass), *Astrebella pectinata* (Mitchell grass), *Manihot utlissima* (bitter cassava), English Horse beans, Kopak, *Artocarpus incisa* (eight varieties from Samoa), *Drymophloeus Normanbii* (black Palm), *Castilloa elastica*, American maize (5 varieties), sorghum (4 varieties), millets (4 varieties), Japan seed rice, Spanish Giant Sweet Potato, chicory, canaigre, macrozamias, &c.

Of these, the horse bean, kopak, one variety of breadfruit, the millets, Japan seed rice, and canaigre have proved failures.

The pump and machinery have been working well, and no large repairs were necessary. The coating of the boiler with asbestos and the substitution of coal and coke for wood fuel have resulted in not only cheaper, but in very much more satisfactory, working. That the purchase of new tools, including plough and scarifier, was fully warranted is amply shown by the improved work in the nursery.

The painting of the buildings mentioned last year is still to be done. Some of the woodwork has never been painted, and the cottage and office buildings, which were partially and but lightly done three years ago, also require repainting now. The fence round the nursery was repaired, and about 150 new beantree posts split and erected by an extra hand employed temporarily and dispensed with on completion of the work. The extra hand allowed for the new clearing has also been dispensed with, leaving extra work upon the other hands. Owing to the comparatively dry season, however, it has been possible to keep both areas clean and in order.

For a short time early in the year, and during my absence on coffee tours, an assistant in the office was temporarily employed, whose services were, however, dispensed with on my return.

Small charges have been made in some instances, sufficient only to cover postages, packing, railage, or cartage. The total amount charged during the past eleven months amounts to £6 8s. 2d., of which £4 0s. 9d. was collected and remitted to the head office. Balance charged but not recovered, £2 7s. 5d.

The nursery sent trophies to the following agricultural shows during the year, which were much appreciated:—Mackay, July, 1901; Port Douglas, August, 1901;

Cairns, September, 1901; and Ingham, September, 1901. The number of visitors to the nursery has been very largely on the increase, especially during the last half-year. Several distinguished visitors from the Southern States have also looked through the nursery. The work of showing visitors round has at times been no light one, and the interruption to the work of both the manager and overseer frequently considerable and, at least, inconvenient at a time when special efforts are being made to economise both in time and expenditure.

The earnest and steady work of Mr. J. G. Malcolm, the overseer, and the interest he takes in the success of the experiments, &c., are commendable, and have proved valuable factors in the present satisfactory condition of the nursery.

HOWARD NEWPORT, Manager.

SCHEDULE A.

ABSTRACT of METEOROLOGICAL OBSERVATIONS for ELEVEN MONTHS ending 30TH MAY, 1902, taken at the State Nursery, Kamerunga, Cairns.—Readings at 9·20 a.m.

Thermometer Readings.	1901.						1902.						Totals and Averages.
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	
Mean maximum	77·32	78·08	77·71	84·41	84·05	87·71	91·08	88·14	85·12	82·90	80·21	...	Mean average maximum, 83·34.
Extreme maximum ...	95·0	86·2	84·0	89·5	89·5	93·2	94·5	92·5	91·0	87·8	84·5	...	Extreme maximum, 95·0.
On date	12th	27th	23rd	22nd	20th	21st	7th	23rd	1st	5th	5th	...	On date, 12th July, 1901.
Mean minimum	56·98	59·43	63·03	65·83	67·38	67·92	72·5	69·71	68·79	64·31	60·79	...	Mean average minimum, 65·11.
Extreme minimum ...	39·0	46·0	53·0	61·0	62·0	60·0	67·0	62·0	61·5	55·0	57·5	...	Extreme minimum, 39·0.
On date	30th	1st	5th	6th	7th	12th	7th	15th	31st	28th	16th	...	On date, 30th July, 1901.
Mean temperatures ..	67·15	68·75	70·37	75·62	75·71	77·82	81·79	78·92	76·95	73·60	70·5	...	Mean average temperature, 74·28.
Rainfall—inches	2·600	1·940	1·717	1·190	5·735	2·155	2·580	10·590	14·240	3·395	2·630	...	Total rainfall for 1900-1901—86·833. ,, ,, 1901-1902—48·772.
Number of days on which rain fell	5	13	8	4	19	12	14	9	15	14	11	...	No. of days rain fell, 1900-1901—138. ,, ,, 1901-1902—124.

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SCHEDULE B.

Plants and Seeds Grown and Available for Distribution at Kamerunga State Nursery, Cairns.

Common.	Botanical.	Plants, Seeds, or Cuttings.
Wine Palm	Diplothemium martimum	Plants
West African Oil Palm	Elæis guineensis	Seeds & plants
Cocoanut Palm	Cocos nucifera	,, ,,
Alexandria ,,	Ptychosperma Alexandræ	,, ,,
Fan ,,	Sabal Blackburniana	,, ,,
Areca ,,	Areca rubra	
Kentia ,,	Kentia monostachya	Seeds & plants
Palm	Cocos plumosa	,, ,,
Date Palm	Phœnix dactylifera	Plants
,, ,,	,, rupicola	Seeds & plants
Sugar ,,	Arenga saccharifera	
Bastard Sago Palm	Caryota urens	Plants
Para Rubber	Hevea braziliensis	Cuttings
Ceara ,,	Manihot Glaziovii	Seeds & plants
Assam ,,	Ficus elastica	Cuttings & plants
African ,,	...	Plants
Central American Rubber	Castilloa elastica	Cuttings
Ramie Fibre	Bœhmeria nivea	Plants
Manila Hemp	Musa textilis	,,
Sisal ,,	Agave rigida	,,
Fourcroya ,,	Fourcroya gigantea	,,
Annatto	Bixa Orellana	Seeds & plants
Seville Orange	Citrus vulgaris	,, ,,
Sweet ,,	,, aurantium	,, ,,
Mozambique ,,	,, ,,	,, ,,
Mandarin ,, (3 vars.)	,, ...	,, ,,
Japanese ,,	,, trifoliata	,, ,,
Pomelloe	,, medica	,, ,,
Kumquat	,, japonica	,, ,,
Sweet Lemon	,, medica	,, ,,
Lemon	,, ,, var. limonium	,, ,,
Lime (2 vars.)	,, ,, ,, limetta	,, ,,
Washington Navel Orange	,, ...	Plants
Mango (many vars.)	Mangifera indica	Seeds & plants
Sour Sop	Anona muricata	,, ,,
Bullock's Heart	,, reticulata	,, ,,
Cherimoya	,, cherimolia	,, ,,
Star Apple	Chrysophyllum cainito	

Common.	Botanical.	Plants, Seeds, or Cuttings.
Banana (8 vars.)	Musa	Suckers
Mulberry	Morus nigrum	Cuttings
Avocado Pear	Persia gratissima	Plants
Granadilla	Passiflora quadrangularis	Seeds
Passion Fruit	,, edulis	,,
Papaw	Carica papaya	,,
Mangosteen	Garcinia mangostana	
Gamboge Mangosteen	,, cochinchinensis	
Pomegranate	Punica granatum	Seeds & plants
Guava (4 vars.)	Psidium guava	,, ,,
Litchi	Nephelium litchi	
Longan	,, longanum	,, ,,
Madagascar Plum	Flacourtia rimontchi	,, ,,
Davidsonian ,,	Davidsonia pruriens	,, ,,
Brazilian Cherry	Eugenia uniflora	,, ,,
Vi Apple	Spondias dulcis	,, ,,
Fig	Ficus carica	,, ,,
Yung Tan	Averrhoa carambola	,, ,,
Wam Pee	Cookia punctata	,, ,,
Kei Apple	Aberia caffra	,, ,,
Rose ,,	Eugenia malaccensis	
Bael Fruit	Ægle marmelos	Plants
Pineapples (4 vars.)	...	Suckers
Cape Gooseberry	Physalis peruviana	Seeds
Tamarind	Tamarindus indica	Seeds & plants
Queensland Tamarind	Diploglottis Cunninghamii	,, ,,
Carob Bean	Ceratonia siliqua	Plants
Fijian Almond	Terminalia catappa	Seeds & plants
Bread Fruit (8 vars.)	Artocarpus incisa	Plants
Jack Fruit	,, integrifolia	,,
Kola Nut	Sterculia acuminata	,,
Rosella	Hibiscus sabdariffa	Seeds
Okra or Bandakai	,, esculentus	,,
Tree Tomato	Solanum betacea	Seeds & plants
Egg Plant	,, melongena	,, ,,
Cassava, Sweet	Manihot aipi	Cuttings
,, Bitter	,, ultissima	,,
Choko	Sechium edule, var. alba	Plants

SCHEDULE B—*continued*

PLANTS AND SEEDS GROWN AND AVAILABLE FOR DISTRIBUTION AT KAMERUNGA STATE NURSERY, CAIRNS—*continued.*

Common.	Botanical.	Plants, Seeds, or Cuttings.
Peanut	Arachis hypogæa	Seeds
Horse-radish Tree	Moringa pterygosperma ...	,,
Pepper	Piper nigrum	Cuttings
,, ...	,, methysticum	,,
Vanilla	Vanilla planifolia	,,
Allspice	Myrtus pimenta	Plants
Cinnamon	Cinnamomum zeylanicum ...	Seeds & plants
Cardamom	Elletaria Cardamomum	
Nutmeg	Myristica fragrans	
Cloves	Eugenia caryophyllata	
Anise	Illicium anisatum	
Tea (Assam)	Thea bohea	Seeds
,, (China)	,, chinensis	,,
Cocoa (2 vars.)	Theobroma cacao	Seeds & plants
Coffee (Arabian)	Coffea arabica	,, ,,
,, (Liberian)	,, liberica	,, ,,
,, (Mocha)	C. arabica, var. Mocha ...	,, ,,
,, ...	,, ,, ,, Maragogipe ..	,, ,,
Rice (3 vars.)	Oryza sativa	Seeds
Tobacco (3 vars.)	Nicotiana tabacum	,,
Castor Oil (2 vars.) ...	Ricinus communis	,,
Black Gram	Cicer arietinum	,,
Pigeon Pea	Cajanus indicus	,,
Coca	Erythroxylon coca	,,
Copal Tree	Hymenæa courbaril	,,
Maté Tea	Ilex paraguayensis	Cuttings
Cotton (2 vars.)	Gossypium arboreum	Seeds
...	Monstera deliciosa	Cuttings
Creeper	Beaumontia grandiflora ...	,,
,, ...	Bignonia venusta	,,
Coralita, Creeper	Antignon amabile	Seeds & plants
Algaroba Bean	Prosopis juliflora	,, ,,
Divi-divi	Cæsalpinia coriaria	,, ,,
Bermuda Arrowroot ...	Maranta arundinacea	Rhizomes
Queensland ,, ...	Canna edulis	,,
Turmeric	Curcuma longa	,,
Jamaica Ginger	Zingiber officinale	,,
Yams (5 vars.)	Dioscorea	Roots & cuttings
Sweet Potatoes (5 vars.) ...	,, ...	,, ,,

Common.	Botanical.	Plants, Seeds, or Cuttings.
Striped Bamboo	Bambusa	Cuttings
Guinea Grass	Panicum maximum	Seeds
Red Natal Grass	,, teneriffæ	,,
Russell River Grass ...	Paspalum galmarra	,,
...	,, dilatatum	Seeds & plants
...	,, platicaule	,,
Cocksfoot Grass	Dactylis glomerata	,,
Mitchell ,, ...	Astrebella pectinata	,,
Candle Tree	Parmentiera cereifera.. ...	Plants
,, Nut	Aleurites moluccana	Seeds
Sorghum and Kafir Corn (10 vars.)	..	,,
Cowpea (10 vars.)	Vigna sinensis	,,
Mauritius Bean (3 vars.) ...	...	,,
Florida Velvet Bean ...	...	,,
Sword Bean (2 vars.) ...	Canavalia ensiformis	,,
Poor Man's Bean	...	,,
Bunya	Araucaria bidwilli	
...	Calophyllum inophyllum ...	Seeds & plants
Loquat	Photinia eriobotrya	,, ,,
Madagascar Bean (3 vars.)	...	Seeds
Dwarf Lima ,, ...	...	,,
Climbing Lima ,, ...	...	,,
Narico Bean	Dolichos lablab	,,
Bauhinia (and vars.) ...	Bauhinia variegata	Seeds & plants
Sappan	Cæsalpinia sappan	,, ,,
Cassia	Cassia grandiflora	,, ,,
,, ...	,, fistula	,, ,,
Rain-tree	Albizzia saman...	,, ,,
..	,, stipulata	,, ,,
...	Poinciana pulcherrima ..	,, ,,
...	,, regia	,, ,,
Kafir Boom...	Hyphœne thebaica	,, ,,
Weeping Fig	Ficus Benjaminica	,, ,,
Indian ,, ...	,, indica	Seeds
Corn Oak	Quercus suber	
Bean-tree	Castanospermum australe ...	,,
...	Erythrina phlebocarpa ...	Seeds & plants
...	,, indica	,, ,,

REPORT OF THE MANAGER, STATE FARM, WESTBROOK.

The crops generally in the winter and spring months of 1901 had a favourable season, and, on the whole, were very satisfactory, the one drawback being the disastrous ravages of caterpillars and grasshoppers, which took place in September and October, amongst the cereal crops, thus seriously militating against a heavy yield. Up to this time the rainfall had been sufficient, but thenceforward it was quite inadequate for the production of good results from most summer and autumn crops. The following table will show the total rainfall for each month, and for the year, which will be seen is very much below the average :—

Month	Inches.	Month	Inches.
July	1·64	January	3.21
August...	6·50	February	1·04
September	1·75	March	·06
October	2·27	April	·40
November	·59	May	·61
December	·31	June	·28

Total rainfall for the year = 18·66 inches.

The following cereals were harvested :—

No. of Block.	Name of Crop.	Area.	Bushels of Grain per Acre.	Tons of Hay per Acre.
	Wheat—			
1	Canadian Blue Stem	2	16	...
2	,, ,, ...	2	...	2¼
3	Marshall's No. 3	4	20	...
4	,, ...	3	20	...
	Barley—			
6	Hallet's Pedigree*	6	...	...
6	Sea of Azov*	6	...	...
	Rye—			
7	English†	1¾	...	2½
	Oats—			
8	Tartarian	4	...	3

* As they were nearly destroyed by caterpillars, &c., a small portion only was saved for seed, part was cut green, and the rest made into hay.

† This was cut when quite green and the awns tender. When made into hay and chaffed up with cowpea straw provided an excellent fodder.

The following experiments were started with the object of continuing them on the same land for a number of years, but owing to the curtailment of this part of the farm by the transfer of land to the Reformatory, other arrangements for carrying out this series will have to be made in future. As manuring experiments this year they cannot be regarded with satisfaction owing to the two following causes, namely :—The want of rain, and the attacks of caterpillars, &c. Neither can the results be taken comparatively, as the blocks were attacked to an unequal extent.

MANURING EXPERIMENTS WITH BARLEY.

The variety sown was Hallet's Pedigree in blocks of ¼-acre each. The experiments were carried out in conjunction with Mr. Brunnich, Departmental Chemist.

No. of Block.	Mark.	Manurial.	Manures applied per ¼-acre at time of sowing.	As top-dressing in spring.	Yields. 1st Grade.	2nd Grade.	Total.
					lb.	lb.	lb.
1	O.	Unmanured	Nil	Nil ...	4·24	27	4·51
*2	N.K.—.	Without phosphoric acid	42 lb. kainit, 12 lb. soda nitrate	12 lb. soda nitrate	4·23	26	449
3	—, K.P.	Without nitrogen ...	42 lb. kainit, 75 lb. Thomas's slagg	Nil ...	394	37	431
*4	N.—.P.	Without potash ...	75 lb. Thomas's slagg, 12 lb. soda nitrate	12 lb. soda nitrate	349	53	402
*5	N.K.P.	Complete manure ...	75 lb. Thomas's slagg, 42 lb. kainit, 12 lb. soda nitrate	12 lb. soda nitrate	415	30	445
*6	½N. ½K.P.	Complete manure, with less nitrate and potash	75 lb. Thomas's slagg, 21 lb. kainit	12 lb. soda nitrate	306	37	343
*7	2 N.2.P.K.	Complete manure, with more nitrate and phosphoric acid	150 lb. Thomas's slagg. 42 lb. kainit, 24 lb. soda nitrate	24 lb. soda nitrate	303	31	334
*8	N. Super.K.	Complete manure ...	64 lb. superphosphate, 42 lb. kainit, 12 lb. soda nitrate	12 lb. soda nitrate	339	46	445

Asterisks denote spring dressing.

The following collection of wheats was sown in May, 1901, on a piece of specially prepared land, for the purpose of ascertaining the earliest and most rust-resisting varieties; but owing to the grasshopper scourge, which took place early in October, the experiment is not complete. The notes attached, showing variety, health, and seasons of wheats, will be of some value for future work in this connection:—

Egyptian, clean, late; Sicilian Baart, clean, late; Forrelia, clean, late; Mica, clean, late; Medeah, clean, late; Egyptian, C 1, clean, late; Egyptian, A 1, clean, late; Egyptian, A 2, clean, late; Young's Bearded, clean, late; Paros, clean, late; Atlanti, clean, late; Banatter, clean, late; Cretan, clean, late; Belatourka, clean, late; Minogan, clean, late; Bearded Club, clean, late; Pugh's R P, clean, late; White-eared Mummy, clean, late; Browneared Mummy, clean, late; Poland, clean, late; Australian Bearded, clean, late; Early Japanese, clean, late; Early Baart, rust on flag, late; Early Bearded, clean, late. All these had been affected with spring rust, but are clean at this date. White Tuscan, clean, showing ear; Budd's Early, clean, ¼-inch in ear; Allora Spring, clean, ½-inch in ear; Australian Monarch, clean, late; Marshall's No. 3, rust on flag, late; Marshall's No. 10, clean, late; Marshall's No. 5, clean, late, weak; Deception, clean, shot blade; 869, clean, late; Ibex, clean, late; R, clean, shot blade, but not showing ear; Best strain, clean, shot blade, but not showing ear; C D 185, clean, shot blade, but not showing ear; 84 B Y, clean, shot blade, but not showing ear; 85 B Y, 86 A 1, clean, shot blade, but not showing ear; 85 A 1, B 1, clean, shot blade, but not showing ear; 86 Y, clean, shot blade, but not showing ear; 85 A B, clean. shot blade, but not showing ear; R 1, clean, shot blade, but not showing ear; 84 C J D, clean, shot blade, but not showing ear; Yandilla No. 3, clean, shot blade, but not showing ear; Eden No. 1, clean, shot blade, but not showing ear; Yandilla Improved Indian, clean, shot blade, but not showing ear; Armstrong, clean, shot blade, but not showing ear; Lilley's Hybrid, clean, shot blade, but not showing ear: Silver King, clean, shot blade, but not showing ear; A F N S, clean, shot blade, but not showing ear; A 1, clean, showing ear; A 2, clean, showing ear; B, clean, showing ear; B A, clean, showing ear; B 1 A, clean, showing ear; B 2, clean, showing ear; B 2, clean, showing ear; B 2 A, clean, showing ear; B 3, clean, showing ear; B 3 A, clean, showing ear; B 4, clean, showing ear; B 4 A, clean, showing ear; C, clean, showing ear; C 1, clean, showing ear; C 2, clean, showing ear; C 2 A, clean, very late; C 3, clean, late; C 3 4, clean, late; D, clean, late; D 1, clean, late; D 2, clean, late; D 3, clean, late; D 4, clean, late; F, clean, showing ear; E, clean, showing ear; E 2, clean, late; F 1, clean, very early, full ear; F 2, clean, very early, full ear; G, clean, late; G A, clean, late; G 1, clean, late; G 2, clean, showing ear; H, clean, showing ear; H 1, clean, showing ear; H 2, clean, showing ear; I, clean, late; I 1, clean, late; J, clean, half in ear; J 1, clean, quarter in ear; J 2, clean, three-quarter in ear; N, clean, late; N 1, clean, late; 2, clean, late; 2 1, clean, late; 2 2, clean, late; 2 3, clean, late; R, clean, late; S 1, clean, showing ear; T, clean, late; T 1, clean late; U, clean, late; U 1, clean, late; V, clean, half in ear; Y, rust in flag, late; C C, clean, late; C C 1, clean, late; D D, clean, late: D D 1, clean, late; E E E, clean, late; F F, clean, late; G G, clean, late; A A, clean, half in ear; I I, rust in flag, late; J J, rust in flag, showing ear; M M, clean, half in ear; N N, clean, showing ear; N N A, clean, late; P P, clean, late: 2 2, clean, late; R R, clean, half in ear; T T, clean, very late; V V, clean, late; X X, clean, showing ear; Y Y, clean, late; B B B, clean, late; C C C, clean, late; D D D, clean, late; E E E, clean, very late; F F F, clean, very early, full ear.

MAIZE.—The varieties of maize sown were published in the issue of the *Queensland Agricultural Journal* of June, 1902, to which readers are referred.

All the varieties were again planted in ¼-acre blocks the second week in December, but failed to cob, and were fed off. A 5-acre block of Golden Superb was planted on the 10th of January; on the 6th of April it was cut into sheaves by the corn harvester, fielded in the stook for one month or more, and then put through the chaffcutter as required. The ripe cobs were plucked off first, and the immature cobs were chaffed up with the stalks. I must say this is proving one of the best rough fodders I ever handled.

Ten acres of Early Hogan failed, and a collection of Sweet Table corn did not do well.

COWPEA.—Last year crops were cut into chaff, and yielded 30 tons, besides 120 bushels of seed; part of the former went to Gindie State Farm, and the available portion of the latter was sold at 10s. per bushel. The present season's yield has been poor.

Millets and Sorghums.—The following varieties were sown on the check row system in ½-acre blocks:—

Sorghum Saccharatum	Did not germinate well owing to the drought, the remainder was totally destroyed by grasshoppers.
„ Collier	
„ Coleman	
„ Folger's Early .	
Broom Millet	
Amber Cane	Seven hundredweight of seed was saved off these four sorts, and sold at 2½d. per lb; the stalks were made into stover, and is now being fed to the farm horses.
Red Kafir Corn	
White „	
Planter's Friend	
Soudan Millet	Trial sowings were made, but failed entirely.
Panicum milliacum	
Setaria Germanica	
Giant Millet	
Pencillaria spicta	
Setaria Italica	
Panicum lexamum	

Potatoes.—These blocks were planted in August. The sets started well (with the exception of No. 3), and gave promise of a fine crop. The soil between the rows was continually stirred with the horsehoe, thereby causing growth and vigour, to be maintained up to the time of tubering; the dry weather which, however, then set in caused a large percentage of small potatoes.

No. of Block.	Variety.	Manure per acre.	Weight of Marketable Tubers per acre.	Weight of Small Tubers per acre.	Total weight per acre.
			T. C. Q. LB.	T. C. Q. LB.	T. C. Q. LB.
1	Brownell's Beauty ...	Nil...	2 0 1 22	1 0 3 16	3 1 1 10
2	Ditto ..	Stable manure	1 1 2 22	1 1 3 24	2 3 2 18
3	Ditto (small sets not budded)	3 cwt. mixed	0 13 3 20	0 5 1 12	0 19 1 4
4	Early Rose	Aust. potash, 4 cwt. ...	1 4 2 16		
5	Ditto	Superphosphate, 4 cwt.	1 3 0 4	0 8 3 10	1 11 3 14
6	Ditto	Nil	1 2 2 0	0 12 3 12	1 15 1 12
7	Ditto	Lime, 25 bags	1 0 1 12	0 10 2 24	1 11 0 8

Peas and Beans.—A ¼-acre of each of Yorkshire Hero peas, and Broad Windsor beans were sown and did remarkably well. After yielding a large quantity of marketable pods, 12 bushels of the former and 10 bushels of the latter were saved for seed, which has since been sold at remunerative rates. Summer crops of French and Lima beans, both dwarf and climbing, were a failure.

Roots.—The Long Mammoth, Red, and Yellow Globe Mangel Wurzel, ¼-acre each, were grown with very good results, likewise crops of the following:—Carrots, including Altringham, White Belgian, Intermediate, Shorthorn, and Long Blood-red, sugar and table beets, and parsnips.

The crop of swedes (Anderson's Purple Top) was the best I have ever seen or heard of being grown on the Downs (*see* October number of the *Agricultural Journal* for particulars). Turnips also were eminently successful. They included the Purple Aberdeen, White Nepaul, Model, and Red American.

Lucerne.—Ten acres had been laid down the previous year. After one cutting of about 5 tons had been taken off, this block, with 30 acres more of our best land, was handed over to the Reformatory. As this leaves us without any suitable land available for this valuable fodder, the loss is severely felt.

Pumpkins and Squashes.—A variety of sorts was grown, including Crown, Button, Ironbark, Turk's Cap, Mammoth, Premium, Mammoth Whale, Mammoth Chille, Scarlet Sugar, Delicata, Columbinum, Custard, Pen-y-bid, Long White, Green Bush, Crookneck, Rice Marrow and Fordrook.

Melons.—A piece of new land was occupied by this crop, which did remarkably well. The crop included watermelons, Cuban Queen (this variety did best of all), Klickly Sweet, Iron Clad, Kobb Green, Cole's Early (very early), Ice Cream, Santiago (new and excellent).

ROCK MELONS.—Netted Green, Hackensack, Rock Ford (new, very good), Perfected Delmonico, and Banquet. Other sections of this family are represented by preserving melons—Citron, Wild Cat, Long Green, Mango, or Peach, &c.

CUCUMBERS.—White Spine, Long Green, Long Prickly, Japanese Climbing, Telegraph, Glenkin, Snake, Sooly, African, Horned, &c. Also an interesting collection of gourds.

CABBAGES ANE CAULIFLOWERS —The marketing of these crops was continued from last year up to September, and resulted in a highly payable return. The present season has not been at all favourable for this crop ; 6,000 plants have been put out, but as we have no means of watering them, anything like a payable return cannot be expected. However, in spite of the drought, some very fine heads of both cauliflower and cabbage have been cut.

MISCELLANEOUS CROPS—The experiment with onions recorded in my last annual report did not turn out as well as could have been desired. After the dry weather set in they failed to bottom properly. Twelve varieties of tomatoes and six varieties of capsicums were grown on a ¼-acre block, and gave fairly good results.

ASPARAGUS.—A large bed of this splendid succulent vegetable was prepared and planted last August. A large number of seedlings are now ready for planting out on the return of favourable weather. A good-sized plantation is intended to be laid down.

SALTBUSH.—A ½-acre of the dwarf variety (*Atriplex halimoides*) has been sown for the purpose of testing its value as a green dry fodder as well as grazing. Another area alongside is ready to receive *Paspalum dilatatum*, which will be planted from stools already in stock. The Old Man Saltbush and *Tagosaste* (tree lucerne) are also grown, both being useful fodders for housed cattle in a season like the present.

Amongst other crops the following have been grown with more or less success :—Artichokes—Jerusalem, Purple, and Green Globe. Beet—Eclipse, Egyptian, Burpee's Round, Anderson's Long Red, and Sea Kale Beet. Borecole—White Plume, Paschal, and Crystal. Endive—Broad-leaved and Triple-curled. Kohl Rabi—Green and Purple. Leek—Lindon Flag and Duke of Palermo. Lettuce—Drumhead, Iceberg, Neapolitan, Thornburn Maximum, and Tom Thumb. Parsley—Dwarf Perfection and Sutton's Green. Radish—Chartier's French Breakfast, Long Scarlet, Red and White Turnip. Salsafy—Long White and three varieties of spinach.

AUTUMN AND WINTER SOWINGS OF CEREALS.—The seed, previous to sowing, was pickled by the "Jensen" hot-water method, and drilled in during the second and third weeks in May. The seed came away fairly well in some of the blocks, but insufficiency of moisture has caused large patches to die right out, and with the exception of one block (Hallett's pedigree) all the rest will probably have to be resown.

Wheat	Marshall's No. 3	20 acres.	
,,	Canadian Bluestem	4 ,,	
Barley	Sea of Azov	6 ,,	
,,	Hallett's Pedigree	6 ,,	
,,	Mold's	4 ,,	
,,	Chilian	3 ,,	
,,	Nepaul	5 ,,	This was sown in March, and has completely died out since.
Rye	English	1 ,,	
,,	Thousandfold	1 ,,	Have not yet germinated.
Oats	Algerian	3 ,,	

THE ORCHARD, in which are planted 1,176 trees of various fruits suitable to the Downs, is looking extremely well. The land has been kept in the highest state of cultivation and perfectly clean.

The trees, from which a full crop is expected next year, are under the care of Mr. S. C. Voller, Assistant Expert in Fruit Culture. They are free from pests. The symmetrical and well-balanced form maintained, campatible with a well arranged system of fruiting woods, prove the correctness of the methods of pruning adopted.

The sales of fruit during the season resulted in good prices being obtained.

VINEYARD.—The remarks relative to cultivation and cleanliless applied to the orchard are also applicable here. Since the vineyard was first established, in 1897, a number of vines have been planted each year. This year the additions were about 1,700, planted last August, and about 4 acres more land have been reserved for further extended operations. The total amount of land under grapes is now 10 acres, on which is erected over 4¼ miles of strong wire trellising, 5 feet high. During the fruit season about 8 tons of grapes were despatched to fulfil orders. I desire to

acknowledge, with thanks, the assistance afforded me by Mr. Richmond, Superintendent of the Reformatory, who sent a squad of boys to help gather the grapes.

The various methods of pruning adopted by Mr. Rainford, who is in charge of this branch of the farm, excite a considerable amount of interest amongst visitors to the farm.

Improvements.—The following improvements have been completed during the year:—The buildings which had previously been used as the men's quarters were enlarged into a structure of 70 feet by 48 feet dimensions, divided into eight commodious rooms—*i.e.*, one for the men, one kitchen, two for the experts, two for fruit-packing, one for fruit-storing, one for a seed store; also a back skillion 16 feet in width for an implement shed, and a 12-foot front veranda.

More than $1\frac{1}{2}$ miles of new grape vine trellis, 5 feet high, strung with five wires, were erected early in the Spring.

The fodder-room behind the stables has been partly floored.

The stackyards and stockyards have been rearranged and other fencing completed with new material.

C. ROSS, Manager.

REPORT OF THE STATE FARM, HERMITAGE.

Last cereal season was, on the whole, a most favourable one as regards rainfall, but towards the latter end, from the following period to maturity, we, among others in the locality, received a visitation of black rust (*Pucinia graminis*) among the wheat crops, which seriously affected susceptible varieties both of spring and midseason class.

It is of interest to record the fact that "spring rust" (*Pucinia dispersa*), which is apparently identical with *P. rubigovera*, appeared on the lower flag of the majority of wheats early in September, but the time when the fatal black rust did the damage was during the second and third weeks of November, when the sap and various functions of plants were completely checked.

Appended are the respective areas and yields from crops sown and harvested in 1901, particulars of preparation of the land being given in the last report. With the exception of Canadian Bluestem, rye, Old English and Nepaul barley, the remaining portion were fed off by sheep during the latter end of July, being taken off finally on 3rd August. The land was then harrowed with the Ajax lever harrows.

It is satisfactory to note that surplus quantities of grain not required for seed purposes brought up to 4s. 4d. per bushel at the Brisbane auction sales.

Areas and Yields of Crops Harvested in 1901.

Area.	Variety.	When Sown.	Harvested.	Yield in Bushels per Acre.
Acres.				
15	Marshall's No. 8 Wheat	7th May	27th Nov.	22
$7\frac{1}{2}$	" " 3 "	13th "	20th "	$21\frac{1}{8}$
3	Canadian Bluestem "	22nd June	...	Badly rusted; failure
$2\frac{3}{4}$	Rye	19th "	21st Nov.	$33\frac{1}{8}$
$7\frac{1}{2}$	Sea of Azov Barley	14th May	1st "	$40\frac{1}{5}$
$7\frac{1}{2}$	Chilian Barley	16th "	28th "	36
$6\frac{1}{2}$	Hallett's Imported Chevalier Barley ...	24th "	13th "	$37\frac{1}{2}$
$3\frac{3}{4}$	Old English " " " ...	18th June	19th "	$39\frac{9}{16}$
$2\frac{3}{4}$	Nepaul Barley	19th "	31st Oct.	$21\frac{1}{2}$

Stud Wheats.—Preparation of land was detailed in last report. Areas, $\frac{1}{2}$-acre each, except Nos. 35 and 36, which occupied $\frac{1}{4}$-acre, and Nos. 37 and 38 $\frac{1}{8}$ of an acre each. Seed drilled in at the rate of $\frac{3}{4}$ of a bushel to an acre at a depth of $2\frac{1}{2}$ inches. Sowing commenced 30th May. Owing to broken weather, Nos. 25 to 38 had to be held over till 17th June before completion. The Cambridge roller was used after the drill. In all cases the seed germinated from the 8th to 12th day after sowing. Growth throughout was very rapid, and in many cases the crops became rank and lodged in patches after wind storms. Such areas showed the ravages of rust in a relatively greater degree. Particulars are appended:—

Artificially Crossbred Wheats, 1901.—Much attention has been given to the collection of wheats classed under the above heading. Some 500 drills, 1 chain in length, were occupied, allowing full room for cultivation, observation, and development. Sowing began on 1st June; harvested 21st November and on the three following days. As the various types of wheat are being fixed by selection of approved sorts adapted to local conditions and increased quantities of seed obtained, it is evident that many valuable varieties of wheat will, in the near future, be added to those already existing, as individual sorts possess most attractive field qualifications. Some likely-looking "sports" have also been secured.

ARTIFICIALLY CROSSBRED WHEATS, 1902.—From the above varieties, 70 odd have been chosen for propagation in larger quantities. To this end a piece of well-prepared land has been divided into rectangular blocks comprising 1-30th of an acre each, divisions being clearly defined. A hoe-drill was put over the land after the Cambridge roller to make small furrows for the reception of the seed, which was previously "pickled" in a 1 in 50 bluestone solution and immersed for five minutes, then dried, broadcasted, and raked in on 27th May and on the three following days. Several small lots of recently imported varieties were also sown.

NOMENCLATURE WHEATS, 1901.—A small collection of these was grown during the past season, and they serve to emphasise the fact that, if a satisfactory market can be found for "Macaroni" wheats, these sorts are capable of producing a class of grain quite fitted for their special purpose. The New Zealand wheats referred to in my last report were sown too late to mature, and were badly affected by rust. Had they been received in time, it is probable a more satisfactory account could have been rendered.

SEASON, 1902.—The outlook for the present cereal season is most disappointing and unsatisfactory, and all seed has had to be sown in dry land, and there has not been sufficient moisture to germinate it. It is quite safe to assume that anything apart from early maturing varieties and spring wheats will not have seasonable limits for grain production. The land was prepared by ploughing to a depth of several inches with a disk plough, harrowed, and cross-harrowed. On fallow land, the spring-toothed cultivator was used. It is worthy of note that, owing to the dry condition of the land, and, moreover, to an increase in hardness, the disk plough showed itself superior for pulverising to the mould board types, although requiring plenty of horseflesh. The respective areas occupied in 1901 have been sown again this season, but the others enumerated have been sown on fallowed land, and in rotation with other classes of crops, to ensure keeping the varieties as pure as possible, &c. All seed wheat and barley had been previously pickled in solution of bluestone 1 in 50, then dried before drilling in at the rate of ¾-bushels to an acre, the machine being regulated to sow full 3 inches deep.

Area.	Variety of Wheat.	When Sown.	Area.	Variety of Barley.	When Sown.
15 acres	Marshall's No. 8 ...	1 May	3·00	Nepaul Barley	22 March
7·50 ,,	,, No. 3 ...	3 ,,	3·00	Mould's Barley (new importation)	6 May
4·10 ,,	Conway's Manitoba	6 ,,	7·50	Sea of Azov	6 ,,
4·10 ,,	Farrer's Crossbred 85 A1, B1	10 ,,	7·50	Chilian	7 ,,
4·10 ,,	Farrer's Crossbred 84 BY	12 ,,	6·50	Hallett's Improved Chevalier	8 ,,
4·10 ,,	Australian Wonder	13 ,,	1·00	Chilian Chevalier	9 ,,
4·10 ,,	Indian Fife ..	14 ,,	3·70	Chilian (new importation) ...	17 ,,
4·00 ,,	Farrer's Crossbred R	15 ,,			
3·70 ,,	Battlefield	15 ,,	2·75	Nepaul	20 ,,
3·50 ,,	Yandilla Improved Indian	16 ,,			
3·00 ,,	Yandilla	16 ,,	2·75	Rye	20 ,,

CHILIAN CHEVALIER BARLEY.—A few ounces of seed were received through the Department from Paris, and sown about the middle of June, 1901. Sufficient seed was obtained to sow the area referred to—1 acre—in 1902. This barley resembles "Chevalier" in the arrangement of glumes, but the ears average quite an inch longer. This is on itself a commendable feature, and has added largely to its prolificness. It also carries an abnormal amount of flag.

EXPERIMENTS WITH FERTILISERS, 1901.—A detailed description of the various fertiliser tests, occupying twenty-four half-acre blocks, was given in last report, Marshall No. 3 wheat being used throughout. It is very unsatisfactory to report that the whole series proved a failure for grain, owing to the ravages of the black rust referred to in the first part of the report, but a heavy cutting of hay was obtained. Under the circumstance no distinction was made.

1902.—This season similar fertilisers have been applied to the respective areas, using "Budd's Early" wheat drilled in simultaneously at the rate of ¾ of a bushel to the acre, previously pickled with bluestone by immersing in a solution of 1 to 50 parts of water for five minutes. Date of sowing, 31st May to 5th June.

MAIZE.—Small experimental lots of the following varieties were made, viz.:—Riley's Favourite, Legal Tender, Golden Beauty, and Large White Horsetooth. The two first mentioned produced attractive and marketable grain, and, considering the season, should prove an acquisition to existing varieties.

Sorghums.—Equal quantities of seed of the following were sown in drills 3 feet apart, each lot occupying one-tenth of an acre, on 15th October, 1901.

Progress was exceedingly slow on account of drought, and the maximum height of the best only averaged 5 feet 6 inches; the remainder were all stunted. The object looked for in testing the relative yields of fodder and grain was defeated. The varieties are here named in order of excellence attained: Folger's Early, Collier, Coleman, Early Orange, Planter's Friend, Amber Cane, Brown Dhourra, *Sorghum saccharatum*, Jerusalem Corn, Red Kafir Corn, White Kafir Corn, *Pennisetum*.

Root Crops.—Areas of one-tenth of an acre were planted with Long Red Mangel beet on 20th September, and smaller sowings were made of large rooted chicory, Long Red Surrey and White Belgian carrot, also Hollow-Crowned parsnip. All the above germinated satisfactorily and carried on well for three months, but the excessive heat and drought proved too much even for well-established mangels and these gradually perished in patches as the season advanced.

A number of experimental areas of about half an acre each were sown down with a variety of seeds consisting of *Atriplex Nummularia, A. Halimoides, A. Semibaccata, Paspalum dilatatum*, Sainfoin, Sheep's Burnet, Dwarf Essex Rape, Thousand-headed Kale and Japanese Buckwheat, while miscellaneous lots consisting of Red and White Clover, Cocksfoot Grass, Crested Dogstail, Tall Fescue, True Sheep Fescue, Chewing's Fescues and Italian Rye were also sown.

With the exception of buckwheat, which is a very rapid grower, the whole of the above resulted in sickly and stunted plants, which finally failed owing to prolonged drought.

Leguminous Crops.—In the middle of September small sowings were made of Black Cowpeas, Soja Beans, Sword, Snake, Waxdale Butter, Zebra, Dwarf French, Anderson's Wonder, Dwarf Butter, and Tonga beans. All the above beans have made satisfactory progress and have given good results, considering adverse conditions, but if a general purpose bean is sought for, the "Tonga" or Madagascar stands out pre-eminently before all others. Although somewhat slow in growth at first, it commenced to pod at the end of December, and continued in bearing up till May, when frosts put a stop to any further progress. It is unsurpassed as a drought-resistant plant when once established, and is an abundant cropper.

Garden Produce.—A miscellaneous collection of plants suitable for household requirements has been grown, but the dry weather has proved too severe for unprotected tomatoes during the summer months. Rock and water melons did fairly well, but no new departures have been made from those varieties which have proved successful in former seasons. The asparagus beds have received a fair share of attention with manuring, and have demonstrated how remunerative this class of crop is. It is to be regretted that this plant is not more largely cultivated.

Potatoes.—This collection was planted in drills 3 feet 6 inches apart on a piece of deeply worked land. A light dressing of sulphate of potash was worked through the soil in the seed furrow before planting on 19th September, 1901. The varieties are named in the order of productiveness attained:—Centennial, Breese's Peerless, Satisfaction, Snowdrop, Improved Early Rose, Extra Early Vermont, Suffolk Champion, The Bruce, Magnum Bonum, White Elephant, Cambridge Kidney, Bliss's Triumph, Up-to-date.

Spanish Sweet Potatoes.—A small quantity of this variety was grown and gave a light yield but of good quality.

Jerusalem Artichokes.—These failed to become established.

Pumpkins.—Premium, Long Tom, Mammoth, and Victory were grown, the former proving the most productive on account of early maturing qualities. The lastnamed, being a recent importation from Africa, where it is said to attain a great size and is also dried for food, did not bear out its reputation. Button, Banana, and Gramma: all these possess some redeeming features; but for an attractive marketable class and good dry boiler the "Ironbark" is hard to excel. Crop light, but some excellent specimens matured. Marrows and squashes grown are named in order of excellence:—Hubbard, Delicata, Boston Marrow, Early Orange, White and Yellow Custard, Long-fruited Bush Marrow, New Mammoth, Scalloped Marrow, Saxon, Pike's Peak, Cocoanut, and Brazil Squash.

The Orchard.—Work in this branch has been under the superintendence of Mr. S. C. Voller, who has already contributed many articles of interest in connection with this work to the *Queensland Agricultural Journal*. The appended notes are confined to ordinary routine. During the past year the orchard received a thorough winter ploughing, and was cultivated nine times, followed by hand hoeing. Pruning was followed up by spraying with a sulphur, lime, and salt mixture as a preventive against the attack of scale. Apricot trees, not being subjected to attack, were not

sprayed. Several replants had to be made on account of damage by storm early last year, while other seedlings were planted out and varieties worked on them. Four lines of plants were sown across the orchard at regular intervals to prevent soil washing, and, after these had finished growth, were supplemented by straw.

The netting of trees, case and crate making, was carried on in preparation for the fruit crop which, from such young, vigorous, and healthy trees, attained good quality and size. Picking, packing, and grading fruit was carried on in due course. Some 300 cases and about a dozen crates were marketed, the demand being greater than the supply. In the majority of cases satisfactory prices were obtained.

THE VINEYARD.—Mr. Rainford has supervised this portion. Routine consisted of painting vines after pruning with solution of sulphuric acid, disbudding, suckering, tying-up vines, &c., and finally marketing the crop of fruit. The vineyard was ploughed four times during the year, and hand-hoed as required. Some excellent table grapes were grown, the Raisin-de-Daine, Raisin de Calabre, Bowwod, and Muscat of Alexandria showing out prominently.

IMPROVEMENTS.—A small stockyard, some extra horse stalls, and a cartshed have been added to the buildings. The workmen have been accommodated with a bathroom under the tankshed, and the sleeping quarters have been lined with hessian. The grazing land is being improved by ringbarking, some 50 acres having been gone over, leaving valuable trees standing and cutting out unlikely sorts. Low-lying land is being drained into the creek depression, and thus a considerable acreage will probably be benefited. Twenty acres of new land have been broken up in preparation for the reception of grass and other indigenous and exotic fodder seeds. A number of trees calculated to beautify the landscape have been planted out, but have not been as successful as desired, on account of the drought.

Representative collections of fruit and produce were made at Warwick and Allora shows.

Appended are the average records of the various thermometers; rainfall being given in full:—

Month.	In Stevenson's Screen.				Earth Thermometers.					Rainfall.	No. of Wet Days.
	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	1 ft. deep.	2 ft. deep.	4 ft. deep.	6 ft. deep.	Terres Radia.		
1901.											
July	49·0	45·4	57·3	35·7	51·9	54·2	58·5	61·4	30·4	1·15	5
August	55·4	49·8	67·8	37·0	53·9	55·4	57·7	59·9	31·5	4·58	6
September ...	64·1	57·6	73·1	41·2	62·7	61·8	60·7	60·5	35·8	1·13	5
October ...	66·3	54·5	75·7	44·3	67·3	67·4	65·5	61·4	40·7	2·56	8
November ...	72·6	62·0	83·6	50·6	74·4	72·9	70·1	68·6	43·2	1·05	1
December ...	80·1	69·7	92·8	59·7	79·7	78·3	75·7	73·1	52·8	0·41	2
1902.											
January ...	75·3	67·0	90·9	63·0	81·1	80·1	79·8	75·3	55·0	2·35	6
February ...	77·7	67·8	90·3	60·1	81·4	81·4	79·1	77·0	53·7	1·55	3
March	74·5	63·9	84·7	54·3	77·8	77·9	77·5	76·0	44·6	1·07	2
April	68·3	59·1	76·6	46·7	71·7	73·0	73·8	73·6	35·1	0·13	2
May	62·5	55·5	71·6	37·0	64·1	66·1	68·5	69·8	30·2	0·33	3
June	55·8	50·3	64·3	35·8	58·6	60·9	63·9	66·2	25·9	0·37	4

The above figures showing total rainfall since date of last report, 30th June, 1901, amounting to 16·68 inches, are sufficient in themselves to show to anyone acquainted with the locality the severe check which these abnormal conditions have given to all branches of primary production. The average rainfall for thirty-six years in Warwick amounted to 29·29 inches.

Extremes of temperature being 105·2 degrees Fahr. in Stevenson's thermometer screen on 18th December, 1901, and 90 degrees Fahr. ground reading on 23rd June, 1902. The last frost in 1901 was on 29th October, and the first frost in 1902 was on 7th April.

H. C. QUODLING, Manager.

STUD WHEATS.—Preparation of land detailed in last report. Areas half-acre each, except 35 and 36, which occupied quarter-acre, and 37 and 38, one-eighth acre each, Seed drilled in at the rate of three-quarter bushel to the acre to a depth of $2\frac{1}{2}$ inches. Sowing commenced 30th May. Owing to broken weather, Nos. 25 to 38 had to be held over till 17th June before completion. The Cambridge roller was used after drill. In all cases seed germinated from the eighth to twelfth day after sowing.

Growth throughout was very rapid, and in many cases the crops became rank and lodged in patches after wind storms. Such areas showed the ravages of rust in a relatively greater degree. Appended are the particulars.

Group.	No. of Block.	Name of Wheat.	Spring Rust on 5th Oct. —1-10.	In Head.	When Harvested.	Yield per Acre. Grain in— Bush.	lb.	Straw in— Tons	cwt.	qr.	lb.	Remarks.
Indian	1	Early Para...	8	26 Sept.	16 Nov.	13	34	1	18	3	14	A very rapid grower
Purple Straw ...	2	Steer's Early PS	5	8 Oct.	19 ,,	17	4	1	16	0	0	Somewhat soft straw
Early Baart ...	3	Early Baart	7	28 Sept.	16 ,,	22	24	1	15	0	21	A bearded wheat
Purple Straw ...	4	Farmer's Friend	5	8 Oct.	19 ,,	8	28	1	6	3	0	Soft straw, attacked badly by black rust
Ditto	5	Hudson's Early	5	8 ,,	19 ,,	16	14	1	11	1	6	Somewhat flaggy
Lammas	6	Australian Talavera ...	2	9 ,,	30 ,,	20	6	1	13	3	22	A useful wheat
Tuscan	7	Battlefield	2	12 ,,	25 ,,	24	36	1	18	0	12	Fine erect straw, bold type of ear
Purple Straw ...	8	Rattling Jack	2	12 ,,	...	...		...				Failure on account of attack of black rust
Tuscan	9	White Tuscan	2	10 ,,	...	...		...				Ditto ditto
Essex	10	White Essex	2	10 ,,	30 ,,	14	2	1	11	0	6	Flaggy, lodged in patches
Farrer's Crossbred	11	85 A1, B1	1	4 ,,	26 ,,	29	44	1	18	2	24	A prolific and desirable class of wheat
Ward's Prolific ...	12	Australian Wonder ...	1	9 ,,	26 ,,	25	0	2	6	1	8	A hardy and useful wheat
Purple Straw ...	13	Red Straw	6	7 ,,	19 ,,	16	8	1	19	2	0	Soft spongy straw, flaggy
Steinwedel ...	14	Steinwedel	6	8 ,,	20 ,,	16	38	1	13	2	26	Soft straw
Purple Straw ...	15	Fillbag	6	12 ,,	20 ,,	16	30	1	19	3	22	Ditto
Lammas	16	Zealand	6	10 ,,	30 ,,	17	52	1	12	2	16	Flaggy
Ditto	17	Leak's RR	3	10 ,,	30 ,,	14	20	1	10	1	0	Did not prove able to resist black rust
Farrer's Crossbred	18	84, BY	4	6 ,,	23 ,,	24	54	1	10	3	6	A very useful class of wheat
Ditto	19	Yandilla Impd. Indian ...	3	6 ,,	25 ,,	11	46	2	0	0	22	A handsome straw, but was badly lodged by storm
Ditto	20	R	3	7 ,,	25 ,,	23	18	1	12	0	26	A useful wheat
Ditto	21	Aspen	3	7 ,,	25 ,,	5	42	1	10	2	10	Did not resist black rust sufficiently to mature good [grain
Ditto	22	Best Strain	2	6 ,,	26 ,,	18	4	1	17	1	18	A useful wheat
Purple Straw ...	23	The Blount	2	11 ,,	...	...		...				Failure on account of attack of black rust. Lodged [badly
Allora Spring ...	24	Allora Spring	2	7 ,,	...	...		...				Ditto ditto
Lammas	25	White Lammas	3	9 ,,	30 ,,	8	28	1	11	1	0	Did not resist black rust
Allora Spring ...	26	Allora Spring (var. Puglis Prolific)	2	7 ,,	23 ,,	16	36	1	12	0	20	Affected slightly with black rust
Ditto	27	Budd's Early	1	9 ,,	23 ,,	14	20	1	16	1	0	Ditto ditto
Lammas	28	White Naples	3	10 ,,	...	...		...				Failure on account of attack of black rust
Fife	29	White Fife	3	10 ,,	30 ,,	12	22	1	9	1	14	Attacked badly with black rust
Velvet Pearl ...	30	Indian Fife	2	5 ,,	19 ,,	20	18	1	8	3	2	A pretty straw, and an attractive though flinty grain
Shelton	31	F1	2	3 ,,	16 ,,	14	44	1	11	0	20	Straw too weak for this class of soil
Ditto	32	Yandilla	2	7 ,,	19 ,,	17	34	2	2	3	22	An erect and attractive-looking wheat
Indian	33	King's Jubilee	2	7 ,,	22 ,,	6	22	1	5	3	22	Badly affected with black rust
Ditto	34	Clubbed Indian	2	8 ,,	22 ,,	18	22	1	7	0	18	A useful wheat for spring sowing, but inclined to be [weak in the straw
Ditto	35	Indian Z	1	7 ,,	22 ,,	13	32	1	8	1	24	Ditto ditto
Ditto	36	Indian F	1	7 ,,	22 ,,	17	48	1	7	1	24	Ditto ditto
Ditto	37	Indian Early	1	7 ,,	22 ,,	13	44	1	8	3	20	Ditto ditto
Poulard	38	Algerian	1	10 ,,	30 ,,	8	40	1	16	3	4	A macaroni wheat, coarse, and stout straw

REPORT OF THE MANAGER, STATE FARM, BIGGENDEN.

The spring months of the year were, on the whole, favourable for cultural operations, giving promise of a successful year which unfortunately did not eventuate. As the season advanced the usual rainfall was not experienced; instead, great heat and scorching winds prevailed, doing much damage to the maize, potato, and other crops. The attached meteorological table is evidence of the adverse circumstances under which all crops had to be grown, and experiments carried out. (Meteorological table attached.)

GENERAL EXPERIMENTS.

MAIZE.—The following varieties experimented with were imported from America:—Legal Tender, Riley's Favourite, Leaming, Golden Beauty, and Piasa Queen; the others—viz, E. W. Horsetooth, Golden King, and Early Yellow Dent, were grown from locally procured seed. An area of a quarter of an acre was devoted to each variety. The seed was sown in rows, 4 feet 3 inches apart, with a distance of 15 inches between the seeds, in ground that had previously been worked to a depth of 8 inches.

Details of results obtained were published in the May issue of the *Agricultural Journal* (1902), p. 341, to which readers are referred.

BARLEYS.—The following varieties were sown in April and harvested in October:—Hallett's Improved Chevalier, Sea of Azov, and Chevalier. A rather heavy fall of rain was experienced just before harvesting, and lodged them badly and somewhat spoiled the colour of the sample. The returns show that this crop is likely to do well in this district. Hallett's Improved, 32 bushels per acre, 56 lb. per bushel. Sea of Azov, 36 bushels per acre, 54 lb. per bushel. Chevalier, 32 bushels per acre, 56 lb. per bushel.

On 22nd April further trial plots were again sown with Hallett's Improved, Sea of Azov, Chilian, and Nepaul. They showed up in little over a week, but have made very little growth since.

OATS.—One acre each of Tartarian and Algerian was sown in March and cut for hay in October. The Tartarian gave a litttle heavier yield, but is somewhat coarser in the straw than Algerian. Both, however, made an excellent sample of hay. The exact returns cannot be given, there being no weighbridge on this farm. Approximately the yield would be—Tartarian, 2 tons per acre; Algerian, a little under. A further sowing of the above varieties has again been made; but, owing to unfavourable climatic conditions, they have so far made but little headway.

SORGHUMS.—These were put in by means of the Planet Junior Seed Drill, in rows 3 feet apart. The seed was sown on 15th October, at the rate of a little over 2 lb. per acre. Very even germination resulted. The plants required scarcely any thinning-out. The drought affected the later stages of growth a good deal. They were cut in their green state and fed to the farm horses, proving a great stand-by during the continued dry weather. The following are the varieties experimented with, together with a few extracts from notes taken during growth:—

Collier.—Seed procured from America. Height, 6 feet. Yield per acre, 15 tons 2 cwt. 2 qr. Good fodder plant.

Folger's Early.—Seed from America. Height, 6 feet. Yield, 15 tons per acre. Makes good fodder.

Early Orange.—Seed from America. Height, 7 feet. Yield, 17 tons 0 cwt. 3 qrs. Well known variety. Very good cropper.

Saccharatum.—Height, 6 feet 6 inches. Yield, 15 tons 2 cwt. 2 qr. Very well known variety. Does not make a good fodder, the stalks being of a fibrous and woody nature.

Egyptian.—More useful as a seed producer than a fodder crop. Height, 4 feet 6 inches. Yield of green stuff, 6 tons. Yield of seed, about 18 bushels per acre.

Brown Dhowra.—Same remarks as applied to Egyptian.

Giant Honduras.—Late variety, very strong stooler and heavy flag. Did not come to maturity owing to lack of moisture. Height, 4 feet 6 inches. Yield, 12 tons per acre.

Planter's Friend—Another well known variety. Height, 5 feet 9 inches. Yield, 15 tons per acre.

Amber Cane.—One of the best. Height, 6 feet 6 inches. Yield, 17 tons 4 cwt. per acre.

White Kafir Corn.—Grown principally for seed. Height, 4 feet. Yield of seed, about 25 bushels per acre.

Millets, Etc.—A few rows of the following varieties were sown on 17th October:—Soudanese, Yellow Dakota, *Panicum germanicum*, *P. milaceum*, *Setaria italica*, *Setaria germanica*. With the exception of the setarias, which produced a fair crop, the others gave poor returns. It was intended to make a full sowing of the above at a later date, but sufficient moisture was not obtained to carry this into effect.

Mangels.—Champion Yellow Globe, Long Yellow, Red Globe, and Long Red were experimented with, but only on a small scale. The trial, however, proved that in an ordinary season an enormous yield of this root crop could be obtained per acre. In all varieties roots weighing from 25 to 30 lb. were common, while some went as high as 35 lb.

Lucerne.—Three-quarters of an acre under this crop has been grown with only a fair degree of success, the soil on this farm not proving suitable. Four light cuttings were obtained during the year.

English Potatoes.—In the beginning of August a small area of Circular Heads were planted, but lack of moisture and extreme heat so effected the crop that both quality and returns were equally poor. Advantage was taken of the light rainfall in March to plant out an acre of Blueskins. As no rain has fallen since to be of any benefit, most of the seed and labour in connection with this experiment will unfortunately be lost.

Sweet Potatoes.—The following varieties are being grown:—Spanish Giant, Yellow Spanish, White Maltese, and Rosella. All have suffered from the adverse climatic conditions, as well as from the ravages of bush vermin. The yield per acre at the time of writing has not been obtained.

Legumes—*Cowpeas.*—The increased demand for seed of this plant shows that its value is becoming much better known. Trial plots were sown on 8th October with the following varieties:—Black, Clay, Piebald, Grey, Large Purple, Small Purple, Large White, Blackeye, Yellow, White's Perennial. The "Blackeye" proved the most worthless of the lot, excepting the "White's Perennial." The others gave equal results. As far as covering the ground is concerned and keeping it covered, if need be for some considerable time, this variety is undoubtedly the best. In spite of the excessive dry weather it is still growing, looking quite healthy and green. From past experience with this variety in other parts of the State, I find that it favours the dry conditions, continued wet being fatal to its growth. It is a very shy seed bearer. As the respective varieties came into bearing a picking of seed was taken, the vines afterwards being cut and fed to the pigs.

Beans.—Suitable for green manuring purposes.

Small Mauritius.—As no seed could be saved from those grown last season a small area was let stand over, so as to give them an early start. As soon as the cold weather was over fresh growth took place, the ground soon getting covered with a dense mass of foliage. The vines have been cut away and used for feeding both cattle and pigs, and have proved a great stand-by during the drought, yielding as much as 30 tons of green stuff per acre. When feeding to cows it is an improvement to cut, say, two days in advance. They relish them better then, when in a semi-dry condition.

The Green, Black, and Mottled Mauritius yielded about half a crop of vines, and very little seed.

Velvet Bean.—A very light crop for this strong-growing variety. It is earlier than the above-mentioned sorts, and will ripen sufficient seeds for further sowings.

Tugg Bean.—Only a small patch grown. Came up very irregularly. Fair crop of vine, plenty of seed pods, but very slow in filling.

Poor Man's Bean.—Did very well. Foliage somewhat scanty to be suitable as a green manure. Very prolific bearer.

Cow Itch (*Mucuna pruriens*).—Only a few plants grown. Produced a very heavy crop of both vine and seed. The saving of the seed would be somewhat against the general use of this plant as a green manure, as the pods are thickly covered with stinging hairs easily detached by the slightest shake, causing great irritation if they fall upon exposed parts of the body.

Sugar-cane.—The ground for this crop was ploughed to a depth of 10 inches and put into thorough good order. On 11th September, the rows were opened out 5 feet apart and the sets planted, allowing 3 feet for each plant. Fully a month elapsed before most of the plants showed through, yet not a single miss occurred. The young plants started out well, and gave promise of a good crop. Unfortunately dry weather set in, checking the growth, which has for the past three months been at a complete standstill.

The following are the varieties experimentd with:—Malabar, Bamboo Seedling No. 1, Caledonian Ribbon, Bamboo Seedling No. 2, Elephant, Bamboo Seedling No. 3, Black Java, Black Zamia, Striped Bamboo, South Sea Island Silk, Rappoe, Big Yellow, Jang Jang, Trebo, Cheribon, Batoc, Bourbon, Red Bamboo, Meves Purple, Silver Bamboo.

There are also a few unnamed varieties being grown. As soon as they make sufficient growth they will be identified and put on the list.

The only varieties that have so far made cane this season are—Batoc, Bourbon, Striped Bamboo, and Red Bamboo. Those suffering most from the drought are the Bamboo Seedlings, Cheribon, and Big Yellow. So far there have been no signs of any disease or "dying out."

GRASSES.—In regard to the testing of grasses, very little has been done on this farm; want of space has been the drawback, but I expect to have this remedied in the near future. We have some 4 acres of forest land cleared for the purpose of carrying out experiments with both native and imported grasses. There is no doubt but that by cultivation and attention, many of our native grasses could be vastly improved and their characters materially changed.

Paspalum dilatatum.—A row of this grass planted out some 18 months ago has developed into very large stools. A small area planted out in one of the grass paddocks at the same time has, however, made but fair growth. The demand for roots has fallen off a good deal lately owing to the unfavourable conditions for planting out.

Paspalum galmarra (Russell River grass).—Seed sown about 18 months ago gives promise of proving a useful grass for this locality. Has remained green and made fair growth, dry conditions notwithstanding.

Small trial plots of 6 perches each have been sown with seed of the following:—*P. dilatatum*, *P. galmarra*, Mitchell grass (*Astrebla pectinata*), cocksfoot grass, red and white clover. Owing to prevailing dry weather conditions they have not yet germinated.

TOMATOES.—New Peach Golden Queen, Democrat, Wonder of Italy, Greengage, Ignotum, Large Trophy, Autocrat, Acme, White Queen, White Peach, Golden Champion, Mikado, Duke of York, Pear-shaped, Dwarf Champion, Yellow Plum, and large Redstone varieties have been grown. Those proving most profitable were the Ignotum, Large Redstone, Duke of York, Golden Champion, and Wonder of Italy. The lastnamed proved a wonderful cropper throughout the dry weather. It is a great pity that this most useful crop does not receive more attention from the hands of the farmers than it does.

PUMPKINS, MARROWS, AND SQUASHES.—The following varieties were sown:—Cattle, Rio, Victory, Crown, Mikado of Japan, Ironbark, and Button. Owing to insufficiency of moisture and hot winds the result was unsatisfactory. The marrows did much better; a fair crop was got from the Custard, Long Green, Long Yellow, and Busk. The same remarks apply to the squashes, the varieties grown being Perfect Gem, Hubbard, Mammoth Chili, and Golden Crookneck.

WATER-MELONS.—A small patch of the following sorts was grown:—Dixie, Semonile, Black-eyed Susan, Ice Cream, Bors, Scaly Bark, Green and Gold, Mountain Sprout, Ironclad, Monarch, and Mango Melon. The weather was too dry to allow this crop to come to perfection. The first four named varieties gave best results.

ROCK-MELONS.—Montreal Nutmeg, Skellman's Netted, Montreal Market, Assage, Yalata, Mango Rock, Deleminca, Bay View, Banana, Surprise, Emerald Green, Cannon Ball, Jersey Belle, Jenny Lind, Musk Rock, and Hakenback were grown, and proved a very profitable crop. Montreal Nutmeg, Bay View, and Banana produced an excellent crop of fine-flavoured fruits for which there was a large local demand. This crop can be raised on far less moisture than that required by the water-melon.

PINEAPPLES.—The patch of pineapples was a good deal affected by the winter cold, even although covered up with grass as a protection from frost. Only two varieties are grown, viz.:—Smooth Cayenne and Ripley Queen. The former produced a few fruits and seems to be the most suitable of the two for the conditions existing on this farm.

ARROWROOTS.—The Queensland variety (*Canna edulis*), and the Bermuda or true arrowroot (*Maranta arundinacea*), are both being tried, but have not yet been harvested.

CASSAVA OR TAPIOCA (*Manihot Aipi*).—The small area planted has made remarkably good growth, in spite of the dry weather. It is likely to become of some considerable value as a pigfeed.

TURMERIC (*Curcuma longa*).—Introduced from the North. Very unsatisfactory results, so far.

JAMAICA GINGER (*Zingiber officinale*).—Poor results: the stiff black soil does not suit this crop.

GARLIC.—A fine crop of bulbs was produced. These were stored for replanting.

ESCHALLOTS.—Good crop, bulbs somewhat small.

TREE ONIONS.—Splendid crop, but did not keep well.

CAPSICUMS.—A varied assortment were successfully grown, some having a very handsome appearance.

EGG PLANT (two varieties), rosellas (two varieties), asparagus, and chokos gave good returns. The latter gave a phenomenal crop, the dry conditions evidently being in its favour. Beans, peas, carrots, onions, &c., have been sown, and cabbages, cauliflowers, &c., planted out. The continued drought has been very much against the successful raising of such, there being no water on the farm available for irrigating or even watering purposes.

ORCHARD.—Little difficulty has been experienced in keeping the orchard in a state of thorough cultivation, and free from weeds. During March the leaves of the young trees in the citrus orchard began to curl up by reason of the dry weather. To save losses, the whole of these were treated to a thorough soaking with water. All the trees look healthy, and are free from scale and other pests. An additional block of land is being prepared for the further planting out of fruit trees. Mr. Voller, Inspector of State Orchards, superintended this work.

VINEYARD.—During the past year two additional rows of vines have been planted, and the whole of the vineyard trellised. The vineyard is becoming a great source of attraction to neighbouring selectors. This is borne out by the very large number of applications already received for cuttings of the various varieties which were under bearing for the first time. A piece of land is being prepared for the planting out of an additional five rows. The orchard and vineyard, when this extension is completed, will occupy about one-third of the whole area under cultivation. Mr. Rainford, viticulturist, has charge of the work in connection with the vineyard.

STOCK.—During the past year a new departure has been entered upon—namely, that of keeping purebred stock on the farm. A purebred Berkshire boar, lent by the Agricultural College, Gatton, has been stationed here since the 7th March. His services are available to the surrounding farmers; but, owing to the severity of the season and the scarcity of pigfeed, they have so far been little availed of. The young Berkshire boar and sow belonging to the farm are coming on well.

A request to have a dairy bull stationed at this farm for the use of surrounding dairymen being granted, the well known Jersey bull, "Lord Harry," was during the last week of May sent from Gatton College for the above purpose.

IMPLEMENTS.—These have all been kept in a thorough state of repair and working order. No new additions have been made during the year.

IMPROVEMENTS.—Three new pigsties with commodious yards have been put up. A small building has been erected for the accommodation of the stud bull, part being used as a loosebox, and part as a fodder-room. Grass paddock No. 2 has been divided by a 3-wire dropper fence. Pipes have been laid from the underground tank to supply both paddocks with water. For the convenience of both farm and visitors, a new entrance gate has been put on the south-east side of the farm. In the grass paddock lying between the cultivation and Biggenden township a large amount of clearing has been effected, all stumps and dead timber having been burned off.

EXHIBITS, ETC.—A collection of the economic products grown on the farm was shown at Maryborough, Biggenden, and Degilbo shows. A great deal of interest was taken in the numerous varieties displayed. Frequent visits are paid to the farm by those locally engaged in agricultural and pastoral pursuits. Every facility is given to all to obtain information on any of the various branches represented. Seed plants and cuttings have been supplied in small quantities to those farmers who have shown themselves anxious to try new varieties of crops in their respective soils. In this way seeds to the amount of 156 packets, 1,455 plants, and 2,879 cuttings have been given out. The above does not include seeds, &c., that have been sold in quantity. The prospects for the new financial year are at present not very promising.

G. B. BROOKS, Manager.

Abstract of Meteorological Observations taken at State Farm, Biggenden, for the Year ending 30th June, 1902.

Temperatures, Etc.	1901.						1902.						
	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May.	June.	
Extreme Maximum ...	73·5	85·0	85·0	88·0	94·0	111·5	103·0	101·5	99·0	92·0	85·0	81·0	Extreme maximum temperature, 115·5, on 19th December
Mean Maximum ...	66 88	72 99	77·63	82·90	85 75	93·45	93·04	93·94	89·11	82·88	79·67	75·7	Mean maximum temperature, 82·82
Extreme Minimum ...	27·0	27·0	36·0	35·0	46 0	51·0	55·0	55 0	44·5	36·0	32·5	30·0	Extreme minimum temperature, 27, on 27th July and 9th August
Mean Minimum	40·22	41·30	49·7	49·54	54·43	60·67	63·30	62·30	56 03	52·58	44·35	38·51	Mean minimum, 51·07
Extreme Terrestrial (Thermometer on Grass) ...	19·0	18·0	30·0	30·0	42·0	46·5	52·0	51·0	40·0	27·5	26·5	21·5	Extreme terrestrial, 18°, on 1st August
Mean Temperature ...	53·55	58·64	63·66	66·22	70·09	77·06	78·17	78·12	72 57	67 73	62·07	57·10	Mean temperature, 58·74
Rainfall, Inches	0·74	2·81	2·11	1·35	0·47	0·92	2·12	0·82	1·80	0·65	Nil.	0·04	Total rainfall, 13·83 inches
Number of days on which rain fell	5	4	7	4	4	2	6	5	1	4	0	2	Total number of days rain fell, 44

REPORT OF THE MANAGER, STATE FARM, GINDIE.

It is with very great regret that I have to place before you such a very unsatisfactory report, but, considering the fearful drought that we have experienced, it could hardly be otherwise.

Owing to the scanty rainfall the 156·66 acres of cereals sown up to 30th June, 1901, was a failure. I endeavoured to harvest a part of the best, but was unable to do so, as the crop was so light, and in consequence the horses were allowed to graze it down.

The 9 acres of lucerne came up nicely, and though it did not make much growth it kept alive until December, when it was fairly roasted with the extreme heat experienced at that time.

The prairie grass did not do so well. It was very stunted, and never reached a greater height than 3 to 4 inches, but with a favourable season and a partly sheltered position it should do very well, and be of good service, as it is at its best when our indigenous grasses are dry.

The 6 acres of vines replanted by Mr. Rainford are almost a total failure—very few of them being alive at the present date. The fruit trees have fared somewhat better. It could not be expected that they could make much growth, but by giving them water as opportunity offered, I have been enabled to keep a good proportion of them alive.

A large amount of useful work was done by the Relief Camp which was formed here. Had we been favoured with good summer rains, the benefit would have been felt both by increased quality and quantity of the grass that would have been available for the cattle. Part of the brigalow that was felled shows no sign of growth from either the roots or stumps, while other portions have sent up suckers from the bottom. A portion of the trees that were ringbarked are dead, but a great number are still alive.

In July, eight varieties of millet and sorghum were planted, also a trial planting of German Beet.

In August, the orchard was ploughed and cowpeas planted in every third furrow. These seeds came up and existed for a time, but eventually had to succumb to the hot dry weather.

In October a further sowing of 8 acres of cowpeas was made, and also 10 acres of maize. The cowpeas came up very well and kept alive until December, when they burnt off with the heat. Only a very small proportion of the maize came up and what did germinate soon withered.

In October 100 lambs were marked. As there are only 162 ewes, I consider the increase a fair one, considering the hard season that the sheep had to contend with.

The adult sheep were also shorn during October. The wool realised £27 9s. 7d. nett. Twenty-four wethers were sold, off the shears, at 8s. 6d. per head and four at 10s. After deducting those that were sold and those that have lately died, there is still an increase of fifty-four over last year's numbers. On 9th June the sheep were sent to Walton on agistment, as it was impossible to keep them on the farm any longer. The agistment is costing 15s. a week.

On 8th April, 161 head of cattle and 7 head of the farm horses were sent on to the Dee River on agistment. For a considerable time previous to this, scrub had to be cut for the cattle in the hope of keeping them alive until rain fell, but as this had not taken place on the above-mentioned date, I concluded to remove them before they got any lower in condition. For the last year the number returned was 170 head, at present the number is 161—showing a loss of 9 head. The agistment on the cattle is 3d. per head per week, and on the horses 6d. As the country on which the cattle are depastured is within the tick area I had them inoculated.

The planting of the present season's cereals was commenced on the 12th May. As I had not sufficient horse strength to work the cumbersome seed drill that we have I was compelled to plough in the greater part of the wheat that had been planted. This, coupled with the fact that the horses are not in a fair condition to do a good day's work, has somewhat delayed this work.

At present date there are 149·99 acres sown with wheat; rye and peas, 1 acre; rye, 2 acres; barley, 95·4 acres. There is still an area of about 21 acres to be sown with wheat. As soon as this work is completed the remaining farm horses will be put out on agistment.

At present there is only one man employed on the farm.

The improvements carried out during the year, in addition to the ringbarking and clearing referred to in the earlier part of my report, were the breaking up of the additional 48 acres of land, the sinking of a well in the 900-acre paddock, and an erection of a windmill, tank, and horse trough at the stables; 250 feet of piping were also procured to convey the water from the tank into a small garden plot. The benefit derived from this is very great, as, notwithstanding the almost total absence of rain for many months, there are at present growing in the garden some very fine vegetables, consisting of cabbage, cauliflower, carrots, turnips, lettuce, radishes, peas, &c., many specimens of which are quite fit for show purposes. The quantity of the above-mentioned vegetables is limited, as it would not have been safe to tax the water supply by growing a larger area; still, there is sufficient to show what could be done even in a severe drought, when water is available.

I may mention that the building of the windmill tower and tank, the erection of the mill, and laying down the pipes was all done with the help of a couple of farm hands, and in all other work I have endeavoured, to the best of my ability, to keep down the expenses as much as possible during the year that has just ended, and I sincerely hope that the year upon which we have now entered will be as prosperous as the last two have been adverse.

The following figures give the rainfall for the year:—

1901.—July	... ... 1·340 fell on 2 days		Total rainfall for the year, 9·07 inches. Highest shade reading, 18th December, 113 degrees; highest solar reading, 160 degrees.
Aug.	... ... 1·770 „ 2 „		
Sep.	... ... 0.810 „ 4 „		
Oct.	... ... 0·528 „ 2 „		
Nov.	... ... 0·020 „ 1 „		
Dec.	... ... 0·565 „ 2 „		
1902.—Jan.	... ... 1·350 „ 6 „		
Feb.	... ... 1·460 „ 6 „		
Mar.	... ... 0·780 „ 1 „		
April	... ... 0·470 „ 3 „		
May	... ... nil		
June	... ... nil		

Lowest temperature, 30th July, 14 degrees. Average temperature in shade from 10th to 20th December, 107·5 degrees.

ROBERT JARROTT.

Agriculture.

REPORT ON WORK—QUEENSLAND AGRICULTURAL COLLEGE.

OCTOBER, 1902.

Farm.—During the month we have had several welcome thundershowers, which have caused the grass to spring and make rapid growth to such an extent that we have now good "picking," and the animals are already beginning to show signs of improvement. The storms also gave us moisture in the soil sufficient for the planting of maize, panicum, &c. The total rainfall was 2·41 inches for eight days, the heaviest fall being on the 28th, when 1·05 inches fell. The continual dry weather has improved the mechanical texture of the soil very considerably, to such an extent that the smallest amount of moisture is retained. The fallow land has now crumbled down, and is now in a condition to produce a good crop when sufficient rain falls. The irrigation plant has been kept constantly at work. Two waterings—the first 3 inches and the second 2 inches per acre—have been applied to 24 acres of lucerne, and 3 inches to 1 acre of potatoes. The method of distribution is the drain and hose system. The flow of water from the pump, 15,000 gallons per hour, is not sufficient to enable us to adopt the flooding system from drains alone, unless these drains were placed at very short intervals, which would mean considerable difficulty in using the mowing machine. Then, again, the unevenness of the land would be a difficulty in the case of the drain system when only a small flow of water is available. We commenced cutting and feeding from the irrigated plot on 16th October. Up to the end of the month, 9 tons 8 cwt. of green lucerne was fed to cattle, 3 tons 9 cwt. 2 qr. to pigs, and 2 tons 4 cwt. to horses. It is needless to state that the second crop is now making rapid growth. The water is pumped, controlled, and distributed by an engine-driver, one labourer, and one boy. The cost of applying water equal to a rainfall of 3 inches is 8s. per acre, made up as follows:—

Hours of work per day, 13; gallons of water raised per hour, 15,000.

	£	s.	d.
Labour—			
Engine-driver	0	5	0
Labourer	0	5	0
Student	0	2	6
Fuel	0	5	0
Wear and tear, belting and hose	0	3	0
Oil	0	1	0
Total	£1	1	6

Area irrigated per day, 2·8 acres.

The teams were kept busy hauling firewood, prickly pear from Laidley (for experimental purposes), sawdust from Gatton (for bedding), also ploughing, harrowing, and preparing land for seeding. During the last week of the month under review we planted 18 acres of panicum in the creek paddock; the seed drill was used for the purpose, 12 lb. of seed to the acre, depth of planting 2 inches. Planted maize in sections 2, 6, 7, and 9—5 acres each. The hour before breakfast was devoted to cutting and splitting dead timber for firewood. A portion of the fencing around newly cleared land in Gatton paddock is now partly erected. Two students, Baker and Fudge, competed at the Lockyer Association's Ploughing Match, and were successful in carrying off the first and second prizes, this being the fourth occasion upon which we have been successful in obtaining first honours at the annual match of the district. Should we be fortunate enough to get a rainfall early in the coming month, planting the different crops will be proceeded with very rapidly. The testing and germinating of seeds was carefully carried out by advanced students; the information thus obtained is invaluable to us, especially when planting seeds which have been held over for a considerable time.

Dairy.—Careful experiments in feeding prickly pear to milch cows and pigs were carried out during the month; the results of these are forwarded herewith. The average number of cows milked daily was fifty. During the month 1,030 gallons of milk yielded 430 lb. of butter, and 250 gallons were supplied to the dining-hall for daily use. In the early part of the month the stock were fed on steamed oaten chaff; and from the 16th to the 31st on a small quantity of green lucerne and a little Cape barley. As soon as the animals were fed on green food a rapid increase in the flow of milk was noticeable, and they appeared to put on flesh very quickly. The increase of the dairy stock for the month included one crossbred and one purebred Ayrshire.

Piggery.—We are now in possession of a very large number of purebred pigs, for which a large demand is expected as soon as the drought breaks up. The animals, during the early part of the month, were fed on waste products from the garden, kitchen, and residents' houses, their condition being well maintained with but little cost to the institution. In the latter part of the month green lucerne was fed with the best results.

Orchard and Garden.—The orchard has had the attention of the Assistant Fruit Expert, Mr. Voller, who, with the assistance of students, carried out the pruning, spraying, &c. Notwithstanding the dry weather, the orchard is looking remarkably well. Mr. Rainford has given the vineyard the necessary attention, and instructed the students as the work proceeded. Both orchards and vineyards have been cultivated on several occasions during the month. The vegetable garden has been kept well to the front, and irrigation applied when required. A large amount of vegetables has always been available for the dining-hall, besides some for disposal.

Mechanical Department.—In this department the principal work has been the erection of a shed over the portable engine on the creek bank. The usual routine work—shoeing, repairs to implements, fences, &c.—has also been carried out.

EXPERIMENTAL FEEDING ON PRICKLY PEARS.

Mr. J. Mahon, Principal of the Queensland Agricultural College, furnishes the following particulars of an experiment made with prickly pear with a view to ascertain its value as a cow fodder:—

Eight head of milch cows, at different periods of lactation, were chosen. They were fed on steamed oaten chaff for five days previous to the use of the prickly pear, and were allowed 40 lb. of chaff each per day. The chaff ration was gradually decreased, and prickly pear fed in its place. It was found advisable to feed at first but a small quantity of the pear, as the cows showed a disinclination to consume it, and also because of the scouring effect it had on the animals when fed liberally. During the second period of five days 8 lb. of pear and 14 lb. of steamed oaten chaff were fed daily night and morning. By gradually increasing the pear ration, it was found that a large quantity could be consumed at one time by the animal without causing any scouring. The prickly pear, before being fed to the stock, was treated as follows:—It was singed on a quick fire for the purpose of destroying the large thorns, and was then boiled for twelve to fifteen hours. After cooling sufficiently to allow its being handled, it was run through a chaff-cutter. The above treatment was considered advisable, as it was found that, while the small prickles were rendered harmless by boiling, the large thorns which are found on the stalks remained hard and stiff enough to penetrate the tongue or jaw of an animal when chewing. After boiling, if a well-matured leaf and a portion of the stalk be taken and the pulp removed, the fibre which remains will be found to be tough and seemingly difficult to digest, but when cut into small pieces it could more readily pass through the digestive organs of an animal.

It will be apparent, from a perusal of the tables, that the milk yield fell off as the prickly pear replaced the oaten chaff. Table I. shows the highest return, and Tables II., III., and IV. disclose a gradual diminution in the yield.

Table V. gives the lowest yield—491·5 lb. of milk for a consumption of 1,745 lb. of prickly pear; while Table VI. shows a slightly increased yield over Table V.—namely, 495 lb. of milk for 2,683 lb. of pear.

Comparing results, as shown in Tables I. and VI., it is found that 1,586 lb. of oaten chaff were consumed for a return of 559 lb. of milk, and 2,683 lb. of pear for a yield of 495 lb. of milk, or in the proportion of 2·83 lb. of chaff or 5·42 lb. of pear for every lb. of milk. The cows lost flesh when fed on the prickly pear alone. We do not look on the pear as a milk-producing fodder, and it is unlikely that it will be used as a stock food under conditions other than those of severe drought.

The following sets of tables give the amount of food consumed and results obtained; and are numbered from 1 to 6, each covering a period of five days:—

TABLE I.

Cow, No.	Period of Duration.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
			lb.	lb.	lb.	lb.	lb.
1	5 days	...	200	56	3·6	2·016	2·257
2	5 ,,	...	195	64	3·8	2·432	2·723
3	5 ,,	...	200	62	4·0	2·480	2·777
4	5 ,,	...	200	58	3·8	2·204	2·468
5	5 ,,	...	190	72	3·6	2·592	2·903
6	5 ,,	...	200	84	3·4	2·856	3·198
7	5 ,,	...	200	66	3·7	2·442	2·735
8	5 ,,	...	200	97	3·5	3·395	3·802
		...	1,585	559	...	20·417	22·863

TABLE II.

Cow, No.	Period of Experiment.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
		lb.	lb.	lb.	lb.	lb.	lb.
1	5 days	80	140	56	3·7	2·072	2·320
2	5 ,,	80	140	66	3·6	2·376	2·661
3	5 ,,	76	140	61	3·8	2·318	2·596
4	5 ,,	80	140	55·5	4·0	2·220	2·486
5	5 ,,	60	130	69	3·4	2·346	2·627
6	5 ,,	80	125	85	3·3	2·805	3·141
7	5 ,,	62	140	62	3·9	2·418	2·708
8	5 ,,	80	140	95	3·3	3·135	3·511
		598	1,095	549·5	..	19·690	21·050

TABLE III.

Cow. No.	Period of Experiment.	Food Consumed.		Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		Prickly Pear.	Chaff, Oaten.				
		lb.	lb.	lb.	lb.	lb.	lb.
1	5 days	100	120	54	3·5	1·890	2·116
2	5 ,,	100	120	64	3·6	2·304	2·580
3	5 ,,	100	120	58	3·8	2·204	2·468
4	5 ,,	100	120	54	3·8	2·052	2·298
5	5 ,,	100	120	63·5	3·3	2·095	2·346
6	5 ,,	100	120	84	3·0	2·520	2·822
7	5 ,,	100	120	60	3·6	2·160	2·419
8	5 ,,	100	120	91·5	3·5	3·202	3·586
		800	960	529	...	18·427	20·635

TABLE IV.

Cow, No.	Period of Experiments.	Food Consumed. Prickly Pear.	Food Consumed. Chaff, Oaten.	Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Butter.
		lb.	lb.	lb.		lb.	lb.
1	5 days	160	60	53	3·6	1·908	2·136
2	5 ,,	160	60	60·5	3·7	2·238	2·507
3	5 ,,	160	55	56	4·0	2·240	2·508
4	5 ,,	160	60	51·5	3·7	1·905	2·134
5	5 ,,	160	60	60	3·4	2·040	2·284
6	5 ,,	160	60	81	3·1	2·511	2·812
7	5 ,,	160	60	58·5	3·6	2·106	2·358
8	5 ,,	160	60	90	3·4	3·060	3·427
		1,280	475	510·5	...	18·008	20·166

TABLE V.

Cow, No.	Period of Experiment.	Food Consumed. Prickly Pear.	Food Consumed. Chaff, Oaten.	Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial. Butter.
				lb.	lb.	lb.	lb.
1	5 days	220	...	51	3·5	1·785	1·999
2	5 ,,	220	...	59	3·7	2·183	2·449
3	5 ,,	220	...	55	4·1	2·255	2·525
4	5 ,,	220	...	53	3·8	2·014	2·255
5	5 ,,	205	...	51	3·3	1·683	1·884
6	5 ,,	220	...	78·5	3·0	2·355	2·637
7	5 ,,	220	...	57	3·5	1·995	2·234
8	5 ,,	220	...	87	3·4	2·958	3·313
		1,745	...	491·5	...	17·228	19·296

TABLE VI.

Cow, No.	Period of Experiment.	Food Consumed. Prickly Pear.	Food Consumed. Chaff, Oaten.	Milk Yield.	Per cent. Butter Fat.	Butter Fat.	Commercial Buttter.
		lb.			lb.	lb.	lb.
1	5 days	305	...	52·5	3·5	1·837	2·058
2	5 ,,	335	...	58	3·8	2·204	2·468
3	5 ,,	343	...	57	3·9	2·223	2·489
4	5 ,,	330	...	51·5	3·7	1·905	2·134
5	5 ,,	350	...	50	3·7	1·850	2·072
6	5 ,,	320	...	77	3·3	2·541	2·845
7	5 ,,	350	...	60	3·5	2·100	2·352
8	5 ,,	350	...	89	3·3	2·937	3·289
		2,683	...	495·0	...	17·597	19·707

PRICKLY PEAR AS A PIG FODDER.

Before feeding the pear to the pigs, it was boiled for twelve or fifteen hours and cut into pieces with a sharp spade. Swill from the dairy was added. The classes of pigs used for the experiment were matured breeding sows and weaner pigs (from ten to twelve weeks old) of Berkshire breed. The prickly pear was eaten readily by the animals. The pigs were fed with as much pear as they would readily consume three times per day. It was found that the matured pigs maintained their condition when fed on prickly pear and swill. The weaners did not thrive at all on the pear fodder: they lost flesh when put on a whole pear allowance, and at the end of a fortnight presented a starved appearance. From this it is evident that prickly pear is not a suitable fodder for growing pigs.

Dairying.

THE DAIRY HERD.

QUEENSLAND AGRICULTURAL COLLEGE.

Returns from 1st to 31st October, 1902.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Blink ...	Ayrshire	28 April 1902	354	3·6	14·27	
Bonny ...	,, ...	15 May ,,	342	3·7	14·21	
Leesome ...	,, ...	15 Jan., ,,	88	4·4	4·33	Dry, 20-10-02
Lena ..	,, ...	3 Dec. 1901	75	4·1	3·44	Dry, 18-10-02
Laura ...	,, ...	12 July 1902	387	3·8	16·47	
Renown ...	,, ...	22 April ,,	349	3·6	14·06	
Realm ...	,, ...	17 May ,,	233	3·6	9·39	
Ruby ...	,, ...	24 July ,,	377	4·0	16·88	
Annie Laurie	,, ...	10 Aug. ,,	428	3·9	18·69	
Laverock ...	,, ...	14 Aug. ,,	471	3·5	18·45	
Lass ...	,, ...	11 July ,,	327	3·5	12·31	With first calf
Lavina ...	,, ...	5 Sept. ,,	392	3·5	15·36	
Linnett ...	,, ...	10 Sept. ,,	501	3·4	19·07	
Lottie ...	,, ...	17 June ,,	275	4·2	12·93	With first calf
Content ...	Jersey	8 June ,,	204	5·0	11·42	
Connie ...	,, ...	8 Sept., 1901	167	4·5	8·41	
Jersey Belle	,, ...	17 Jan., 1902	154	4·8	8·27	
Playful ...	,, ...	3 July ,,	454	4·0	20·33	
Stumpy ...	,, ...	17 Mar. ,,	399	4·5	20·10	
Sweet ...	,, ...	6 June ,,	348	4·2	16·36	With first calf
Carrie ..	,, ...	15 Sept. ,,	437	3·8	18·59	
Double ...	Grade Jersey ...	9 June ,,	263	4·2	12·36	With first calf
Brindle ...	,, ,, ...	6 June ,,	354	3·9	16·57	With first calf
Witch ...	,, ,, ...	13 May ,,	368	3·5	14·42	With first calf
Damsel ...	Holstein	16 Jan. ,,	378	3·6	15·23	
Angel ...	Holstein Devon...	5 Dec., 1901	68	4·3	3·27	Dry, 20-10-02
Night ...	,, ,, ...	29 April 1902	322	4·2	15·14	With first calf
Mona ...	Holstein Sh'rth'rn	3 June ,,	384	3·7	15·96	With first calf
Reanie ...	,, ,, ...	7 Mar. ,,	348	4·2	16·36	With first calf
Alice ...	Grade Shorthorn	18 Jan., ,,	314	4·0	14·06	
Catch ...	,, ,, ...	13 Feb. ,,	204	3·8	8·68	With first calf
Drone ...	,, ,, ...	12 May ,,	222	3·9	9·68	With first calf
Haze ...	,, ,, ...	11 Feb. ,,	177	3·8	7·52	With first calf
Lilly ...	,, ,, ...	22 Feb. ,,	324	4·0	14·51	With first calf
Leomon ...	,, ,, ...	18 June ,,	365	3·4	13·89	With first calf
Peggie ...	,, ,, ...	15 June ,,	231	3·8	9·82	
Princess ...	,, ,, ...	5 June ,,	274	4·1	12·57	With first calf
Restless ...	,, ,, ...	16 Mar. ,,	312	3·8	13·27	
Rowly ...	,, ,, ...	22 April ,,	318	3·7	13·17	With first calf
Cherry ...	Shorthorn ...	25 May ,,	248	3·6	9·99	
May ...	,, ...	26 June ,,	316	3·6	12·73	
Nestor ...	,, ...	31 July ,,	495	3·5	19·39	
Plover ...	,, ...	7 Feb. ,,	208	3·6	8·37	
Rose ...	,, ...	10 April ,,	363	3·7	15·02	
Winnie ..	,, ...	17 June ,,	342	3·6	13·78	With first calf
Violet ...	,, ...	20 Jan., ,,	83	4·1	3.81	Dry, 15-10-02
Guinea ...	,, ...	9 June ,,	320	3·4	12·18	
Lucy ...	,, ...	14 Aug. ,,	345	3·6	13·91	
Queenie ...	,, ...	2 Sept. ,,	330	3·5	12·93	
Fancy ...	South Coast ...	19 Jan. ,,	335	4·0	15·00	
Topsy ...	,, ,, ...	4 Oct., 1901	302	3·6	12·17	With first calf
Grace ...	,, ,, ...	18 Sept., 1902	361	3·6	14·54	With first calf
Lady Rose ...	Guernsey ...	26 Feb. ,,	268	5·0	15·00	

Answers to Correspondents.

TO GET RID OF BLACK ANTS.

CHARLES KUCHS, Gatton.—(1.) Try sprinkling shelves, &c., with oil of pennyroyal. (2.) Wash with carbolic soap. (3.) Dissolve a piece of ammonia the size of a hen's egg in one quart of water and brush the shelves with it. (4.) Pour gasoline into their nests (if outside) and set fire to it. (5.) Lay carpet rag strings soaked in corrosive sublimate in their path. (6.) Make the following mixture:—White lime (slaked), 6 quarts; kerosene oil, ½ pint; turpentine, 1 wineglass; softsoap, 5 lb.; cowdung, 3 quarts; water, 16 quarts. This latter is for washing fruit trees. None of these remedies are permanent, but will require repeating often.

PARTNERSHIP AGREEMENT.

E. COURT, Mooloolah.—Consult a solicitor on this point. You may draw up an agreement and sign it in the presence of a witness. Stamp duty, 2s. 6d.

EAR-MARKING STOCK.

Under the last amendment of the Brands Act (Collins' Act) all earmarks on cattle must be registered with the Registrar of Brands.

POWDERED MILK.

JOHN SIMPSON, Rockhampton.—Powdered milk is only a recent invention, and has but lately been proved of commercial value in Europe. It has not as yet appeared in Queensland. Why not address a letter to the inventor in Sweden?

PAINT FOR IRON ROOFING.

E. POPE, Lower Proserpine.—Refrigerating paint can be obtained from most oil and colour merchants in Queensland. A cheap cooling paint may be made as follows:—

Take unslaked lime, and slake it with sufficient water to cover it. Stir into it old brine from a salt-beef tub, sufficient to give the lime the consistency of oil paint. Strain before using, and apply with an ordinary 2-knot limewash brush.

Ruberoid makes excellent roofing. Obtain particulars from agents, E. Rich and Co., Brisbane. It is not as durable as iron, but it is largely used, both on the railways and by private persons.

DEHAIRING GLUE PIECES.

W. O'D., Delaney's Creek, Caboolture.—*See* note on tanning hides on page 378, Vol. XI., part 5 (November, 1902) of *Journal*.

TIMBER FOR CASKS.

E. J. WALTON.—American oak and silky oak are used for wine casks, but no timber will keep out the borer. New and old casks may be had from Mr. Lanham, cooper, Charlotte street, Brisbane. The old imported casks are the best. 36-gallon old casks, 10s. 6d. each; 36-gallon new casks, of American oak, 23s. each; 36-gallon casks, silky oak, 19s. each, store casks, of from 50 to 100 gallons, special arrangement as to price.

CONTENTS OF TANKS AND WELLS.

NIELS LORENSEN, Mount Beppo.—

No. 1.—Underground tank 15 feet deep, 22 feet in diameter. Radius, 11 feet; square of radius, 121. $121 \times \frac{22}{7} = 380\frac{2}{7}$ square feet = area of top or bottom. $380\frac{2}{7} \times 15 = 5{,}704\frac{2}{7}$ cubic feet. $277\frac{1}{4}$ cubic inches = 1 gallon, $5{,}704\frac{2}{7}$ cubic feet =9,856,759 cubic inches, which, divided by 277·25 = 35,551·88 gallons, the volume of the tank.

No. 2.—Well 8 feet wide and 10 feet long. Depth of water, 5 feet. $8 \times 10 \times 5 = 400$, the content of water in cubic feet.

$$\frac{400 \times 1{,}728}{277{\cdot}25} = 2{,}489{\cdot}3 \text{ gallons.}$$

No. 3.—Well 3 feet wide, 5 feet 10 inches long; depth of water, 4 feet 6 inches. Reducing the measurements to inches, $36 \times 70 \times 54 =$ 136,080 cubic inches, which, divided by 277·25 = 490·08 gallons.

MELILOTUS.

JAMES WRIGHT, Maroochie—The plant is one of the legumes, allied to lucerne and clover. The name is *Melilotus parviflora*, and it is an excellent forage plant, stock being exceedingly fond of it. It is a good flowering plant for beekeepers.

A QUESTION OF FENCING.

JAMES LATIMER, Yatala.—Your question involves points which require legal advice. We cannot ourselves settle the matter even with the help of the Fencing Act.

RUBEROID ROOFING.

MEDIUM, Kolan.—In answer to your two first questions, we forwarded you, by post, full directions for the use of ruberoid as supplied by Messrs. E. Rich and Co., the agents in Brisbane.

The Markets.

TOP PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	OCTOBER. Top Prices.
Apples, Tasmanian, per case	13s.
Apples, American, per case	16s.
Pears, per quarter-case	8s.
Oranges, per case	13s. 6d.
Lemons, local, per case	15s.
Loquats, per half-gincase	5s. 6d.
Pineapples, rough, per dozen	5s.
Pineapples, Queen, per dozen	7s.
Bananas, per bunch	1s. 6d.
Bananas, per dozen	2½d.
Cape Gooseberries, per quart	5½d.
Cherries, per quarter-case	16s.
Tomatoes, per quarter-case	6s.

AVERAGE TOP PRICES FOR OCTOBER.

Article.		October. Top Prices.
		£ s. d.
Bacon	lb.	0 0 11¾
Bran	ton	8 15 0
Butter, First	lb.	0 1 1¼
Butter, Second	"	0 0 11½
Chaff, Mixed	ton	8 0 0
Chaff, Oaten	"	7 16 3
Chaff, Lucerne	"	12 6 3
Chaff, Wheaten	"	7 0 0
Cheese	lb.	0 0 10¾
Flour	ton	11 0 0
Hay, Oaten	"	7 0 0
Hay, Lucerne	"	9 0 0
Honey	lb.	0 0 3
Rice, Japan (Duty paid)	ton	22 17 6
Maize	bush.	0 6 0
Oats	"	0 4 4
Pollard	ton	8 16 3
Potatoes	"	7 18 9
Potatoes, Sweet	"	...
Pumpkins	"	10 15 0
Sugar, White	"	19 2 6
Sugar, Yellow	"	16 10 0
Sugar, Ration	"	13 12 6
Wheat	bush.	0 5 6
Onions	cwt.	0 7 11¼
Hams	lb.	0 1 1¼
Eggs	doz.	0 0 11
Fowls	pair	0 4 3¾
Geese	"	...
Ducks, English	"	0 4 10½
Ducks, Muscovy	"	0 5 5¼
Turkeys, Hens	"	0 7 9¾
Turkeys, Gobblers	"	0 17 3¾

ENOGGERA SALES.

Article.	October. Top Prices.
	£ s. d.
Bullocks	22 1 10½
Cows	17 6 3
Wethers, Merino	1 9 10½
Ewes, Merino	1 5 5¼
Wethers, C.B.	1 14 0
Ewes, C.B.	...
Lambs	0 13 10
Baconers	3 10 6
Porkers	1 8 3
Slips	0 7 6

Orchard Notes for December.

By ALBERT H. BENSON.

In the Orchard Notes for November, I called special attention to the importance of marketing fruit properly, emphasising the necessity for careful handling, even grading, and attractive packing if satisfactory prices are to be obtained. Those remarks apply equally to the present month, or, in fact, to any month of the year, as there is always more or less fruit of one variety or another to be marketed; and it is simply wasting time and money cultivating, pruning, manuring, or spraying an orchard—in fact, doing everything possible to produce good fruit—if when the fruit is grown it is not put on the market in such a manner that it will realise the highest price. Careful handling, grading, packing, and marketing will secure a ready sale for good fruit in any market, even when the same fruit badly handled and unattractively got up would be unsaleable. Growers would do well to take a lesson in packing from the Californians who have been shipping apples, or from the Italians who are shipping lemons, to this colony, as those fruits, even after a long and trying voyage and one or more transhipments, reach here in better condition and in a much more attractive state than our local fruit, which is often only carted a few miles.

Keep down pests wherever met with; gather and destroy all fly-infested fruit. Destroy orange bugs before they become mature by hand-picking or by driving them to the trunks of the trees, by tapping the other branches with light poles, the insects being brushed off from the trunks and main branches on to a sheet placed under the tree to catch them, from which they can be easily gathered and burnt.

All caterpillars, cut-worms, beetles, grasshoppers, crickets, orother insects destroying the foliage should be destroyed by either spraying the same with Paris green, 1 oz. to 10 gallons of water, or by dusting them with a mixture of Paris green and air-slacked lime, 1 oz. of Paris green to 5 lb. of lime. Keep the orchard well cultivated, especially in the dry districts; and where there is water available for irrigation, in such districts all citrus trees should receive a watering during the month unless there is a good fall of rain, when it will be of course unnecessary.

Pineapples, bananas, and other tropical fruit can be planted during the month, showery weather and dull days being chosen. The rainy season is the best time to transplant most tropical plants. Where it is desirable to go in for green-crop manuring, or for raising the green crop for mulching, cowpeas can be sown, as they will be found to make a very rapid growth now, which will be strong enough to keep most weeds in check.

See that all surface and cut-off drains are in good working order, and not choked up with grass, weeds, &c., as heavy rain may fall during the month, and there should be a get-away for all surplus water, which would tend to either wash the soil or sour it; stagnant water round the roots of the trees being exceedingly injurious at any time, and especially so during the heat of summer.

Farm and Garden Notes for January.

Field.—The main business of the field will be ploughing and preparing the land for the potato and other future crops, and keeping all growing crops clean. Never allow weeds to seed. This may be unavoidable in the event of long continued heavy rains, but every effort should be made to prevent the weeds coming to maturity. A little maize may still be sown for a late crop. Sow sorghum, imphee, Cape barley, vetches, panicum, teosinte, rye, and cowpeas. In some very early localities potatoes may be sown, but there is considerable risk in sowing during this month, and it may be looked upon merely as an experiment. Plant potatoes whole.

Kitchen Garden.—A first sowing of cabbage, cauliflower, and Brussels sprouts may now be made in a covered seed bed, which must be well watered and carefully protected from insect pest. Sow in narrow, shallow drills; they will then grow more sturdy, and will be easier to transplant than if they were sown broadcast. The main points to be attended to in this early sowing are shading and watering. Give the beds a good soaking every evening. Mulching and a slight dressing of salt will be found of great benefit. Mulch may consist of stable litter, straw, grass, or dead leaves. Dig over all unoccupied land, and turn under all green refuse, as this forms a valuable manure. Turn over the heavy land, breaking the lumps roughly, to improve the texture of the soil by exposure to the sun, wind, and rain. In favourable weather sow French beans, cress, cauliflower, mustard, cabbage, celery, radish for autumn and winter use. Sow celery in shallow, well-drained boxes or small beds, which must be shaded till the plants are well up. Parsley may be sown in the same manner. Turnips, carrots, peas, and endive may also be sown, as well as a few cucumber and melon seeds for a late crop. The latter, however, are unlikely to succeed, except in very favourable situations. Transplant any cabbages or cauliflowers which may be ready. We do not, however, advise such early planting of these vegetables, because the fly is most troublesome in February. For preference, we should defer sowing until March. Still, as "the early bird catches the worm," it is advisable to try and be first in the field with all vegetables, as prices then rule high. Cucumbers, melons, and marrows will be in full bearing, and all fruit as it ripens should be gathered whether wanted or not, as the productiveness of the vines is decreased by the ripe fruit being left on them. Gather herbs for drying; garlic, onions, and eschallots as the tops die down.

Flower Garden.—The average mean shade temperature for January at Brisbane is 76 degrees, and the average mean rainfall is 7·10 inches. The weather during the month is usually muggy, the air being very moist, and the growth of plants consequently rapid.

During the early part of the month, should we be favoured with rain, it is a good time to plant all tropical plants, and the first sowing of seeds of annuals for the flower garden will require to be made. The ease with which a person can provide a stock of annuals sufficient to make any garden gay during the autumn and winter months is not generally recognised. Small boxes or pans—a separate one for each variety of seeds—should be prepared; and a compost, into which decayed leaves largely enter, should be got ready. The compost should be of such a consistency that, when taken in the hand and squeezed, it will fall asunder at the slightest touch. In sowing annuals, let them be sown thinly, so that a little delay in pricking off may not do them so much harm as if sown thickly in the first instance. The surface of the soil should never be watered so heavily as to wash it about; and when the young seedlings are large enough to handle, they should be lifted one by one and, with the aid of a label or knife, planted into beds or boxes of very light soil, still with a goodly proportion of leaf soil. Even if they seem thin enough in the seed boxes, it is better to prick them off in this way. You must look out for insects. The marauding slug

dearly loves the succulent young annual, and will go a long distance (for a slug) to get it. A quantity of soot or ashes thrown in his path has a most discouraging effect, and makes him think the game hardly worth the candle.

All kinds of shrubby plants may be propagated by cuttings, these being chosen in the majority of cases with a heel of old wood. That class of *Pelargonium* commonly called "geraniums" may also be readily propagated in this way. These plants do remarkably well in Queensland, and yield some splendid flowers. Of course you can propagate coleus, crotons, and all kinds of tropical foliage plants this month very readily. By stretching a piece of thin calico on a frame of lath, it is possible to make a capital propagating frame which will serve to keep the air moist around your cuttings and to prevent currents of air, which by carrying off the moisture from the cuttings often prove fatal. Weeds, too, will not grow so readily where there is a slight shade kept by this means.

During this month you will have to pay particular attention to all pot plants. There is so much growth that plants grown under the artificial conditions of planthouses will, if they are allowed to become dry, easily sustain permanent injury. When a pot plant becomes thoroughly dry, it is often impossible to water it by means of the ordinary watering-can, as the water runs off through the loose earth on the outside, and, although the plant appears to be thoroughly well watered, it is quite dry in the middle of the ball of earth which surrounds its roots. The remedy is to stand the pot in a bucket or basin of water until air-bubbles cease to be given off.

There is a tendency at this season, both indoors and out, to over-water. As was pointed out last month, this requires to be carefully guarded against. A stringent ukase against the undue use of the garden hose in suburban gardens would do as much as anything to enhance the beauty of their floral occupants.

Look out for insects this month. The scale insects especially will be increasing at a great rate, and will need a wary eye to keep them under control. The difficulty in dealing with these pests often is that the trees which they love the most are tall and difficult to get at. By balancing a long bamboo across an upright arrangement supported in a cart or wagon, and swinging it about like a gigantic fishing pole, we find it possible to reach trees at a considerable height. In this way the scales on lofty trees can be treated to a dose of resin-wash or kerosene emulsion, or, what we use very frequently, kerosene simply mixed with the water by means of the mixing arrangement attached to the Doncaster spray pump. This method of using kerosene saves a great deal of trouble in mixing, and leaves a very fine film of the oil over the leaves. It is, however, best adapted for trees and plants with hard leaves, for we find that it injuries foliage which is at all delicate. The quantity of kerosene can be regulated very nicely by the apparatus, when one has had a little experience of it, and, of course, a larger quanity of kerosene is used with a tough than with a delicate subject.

Propagate verbenas, choosing only the best varieties. It is better to have two or three well and distinctively coloured sorts than a large variety of washy colours. They will make a great display by-and-by. The variety known as Foxhunter makes a perfect blaze of scarlet, and requires to be planted in a mass, or in a long line in a border, where it shows up well. They like tolerably rich ground.

Palms may be planted out all through the month. If the weather should prove at all dry, see that the young trees are shaded, and in planting disturb the roots as little as may be. Lawns must be well looked after. Where there is a paucity of labour, which is a common case everywhere in Queensland, these are apt to get out of hand, and January is a month during which it is a most difficult task to keep them looking well. We use an ordinary Buckeye agricultural mower for the larger lawns, and for the finer lawns a Shanks golf links machine. This is a great improvement on the old lawn mower, as it is provided with prings which enable it to "give" with any inequalities of the ground. The

grass-collecting arrangement has been removed, and the grass is allowed to fall on the lawn and to remain there. It soon withers up, and becomes a protection to the grass, not being in the least unsightly. The surface of the ground in beds and borders must be kept stirred to a depth of about 3 inches, and weeds must be fought. Do not let them seed.

If you have a kitchen garden—and there is no reason why you should not—this is the month to begin operations. And if you have not a garden of vegetables and herbs, you cannot make a better new-year resolution than to have one at once. A very little one will keep you and your family in vegetables for the whole year round. The quantity of meat which is eaten in this country without the necessary accompaniment of sufficient vegetables is appalling. There is a Chinaman in Albert street, Brisbane, who has a few square yards of a garden, and out of that tiny patch he manages to get in the course of the year a supply of vegetables which, if they were all placed together, would make the owner of many a larger holding stare. The cottager who wants to start a vegetable garden may sow the following:—Beans, beets, broccoli, Brussels sprouts, cabbage, choko, carrots, cauliflower, celeriac, egg-plant, endive, lettuce, parsley, peas, radish, spinach, tomatoes, turnips, all sorts of pot herbs, mustard and cress at short intervals. Towards the end of the month make another sowing of these. You will find the watching of your seedlings, and the care of them in pricking them off and defending them against their insect enemies (which beset them even more persistently than in the case of flower seedlings), a most interesting occupation.

Times of Sunrise and Sunset, 1902.

DATE.	SEPTEMBER.		OCTOBER.		NOVEMBER.		DECEMBER.	
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1 ...	6·6	5·30	5·32	5·44	5·2	6·2	4·50	6·24
2 ...	6·5	5·31	5·31	5·45	5·0	6·3	4·50	6·24
3 ...	6·4	5·32	5·29	5·45	4·59	6·5	4·51	6·25
4 ...	6·2	5·32	5·28	5·46	4·58	6·6	4·51	6·25
5 ...	6·1	5·33	5·27	5·47	4·57	6·7	4·51	6·26
6 ...	6·1	5·33	5·26	5·47	4·57	6·7	4·51	6·28
7 ...	6·0	5·34	5·25	5·47	4·57	6·7	4·51	6·28
8 ...	5·59	5·35	5·24	5·48	4·56	6·8	4·50	6·30
9 ...	5·57	5·35	5·23	5·49	4·56	6·8	4·50	6·30
10 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·31
11 ...	5·56	5·36	5·21	5·49	4·55	6·9	4·50	6·32
12 ...	5·54	5·36	5·21	5·49	4·55	6·9	4·50	6·32
13 ...	5·53	5·37	5·20	5·50	4·54	6·10	4·51	6·23
14 ...	5·51	5·37	5·19	5·50	4·54	6·10	4·51	6·33
15 ...	5·50	5·38	5·18	5·50	4·54	6·12	4·52	6·34
16 ...	5·49	5·38	5·18	5·50	4·53	6·13	4·52	6·34
17 ...	5·48	5·38	5·17	5·51	4·52	6·14	4·53	6·35
18 ...	5·47	5·39	5·15	5·51	4·51	6·15	4·53	6·35
19 ...	5·45	5·39	5·15	5·52	4·50	6·16	4·54	6·36
20 ...	5·44	5·40	5·13	5·53	4·49	6·17	4·54	6·37
21 ...	5·43	5·40	5·13	5·53	4·49	6·18	4·54	6·38
22 ...	5·42	5·40	5·12	5·54	4·49	6·18	4·54	6·38
23 ...	5·41	5·41	5·11	5·55	4·49	6·19	4·55	6·39
24 ...	5·39	5·41	5·9	5·55	4·49	6·19	4·55	6·39
25 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
26 ...	5·38	5·42	5·8	5·56	4·49	6·21	4·56	6·40
27 ...	5·36	5·43	5·7	5·57	4·49	6·21	4·57	6·41
28 ...	5·35	5·43	5·6	5·58	4·49	6·22	4·57	6·41
29 ...	5·34	5·44	5·5	5·59	4·49	6·22	4·58	6·42
30 ...	5·32	5·44	5·4	6·0	4·49	6·23	4·59	6·42
31 ...	...	...	5·3	6·1	...	...	4·59	6·42

PHASES OF THE MOON.

			H.	M.
1 Sept.	●	New Moon	17	19·4
9 „	☽	First Quarter	10	14·9
17 „	○	Full Moon	6	23·4
24 „	☾	Last Quarter	4	31·5
1 Oct.	●	New Moon	5	9·1
9 „	☽	First Quarter	5	21·1
16 „	○	Full Moon	18	1·1
23 „	☾	Last Quarter	10	58·1
30 „	●	New Moon	20	13·6
8 Nov.	☽	First Quarter	0	30·5
15 „	○	Full Moon	5	6·5
21 „	☾	Last Quarter	19	46·9
29 „	●	New Moon	14	4·4
7 Dec.	☽	First Quarter	18	26·5
14 „	○	Full Moon	15	47·4
21 „	☾	Last Quarter	8	0·2
29 „	●	New Moon	9	24·8